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- Completely Modernise Rooms
- Successfully Apply Wallpaper
- Paint Woodwork and Furniture
- Build Your Own Garage
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- Make All Types of Concrete
- Look After Your Tools
- Use Solder Successfully
- Make Garden Furniture
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- Build a Home Work Bench
- Stain and Polish Woodwork
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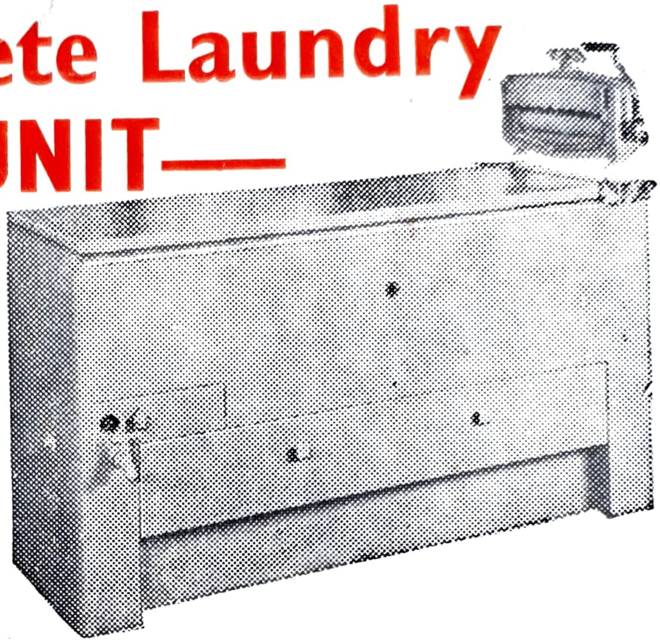

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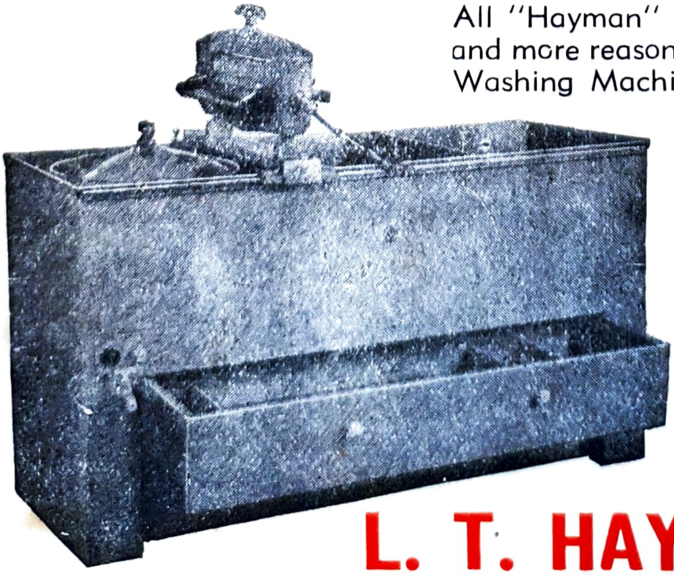

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How To Use This Book To Increase Your Skill At Home Handy Work

SO popular was the first edition of "Do It Yourself" that all copies were sold in a few months. Readers found it gave them just the tips they needed to go ahead with confidence, whether painting, papering, enamelling, concreting, lining a batch or sun-porch, building in a cupboard, or, in fact any of the hundreds of jobs around the home.

This second edition should make an even stronger appeal. Not only does it give short-cut money-saving ways to repair or modernise a home but simple, complete instructions on making useful, modern furniture of all kinds—from kitchen tables and chairs to a set of bookcases or a three-piece bedroom suite.

THIS book was written for the novice as well as the experienced handy-man. Provided you have ordinary commonsense and the necessary tools, nothing in this book should be beyond you. The only two essentials are—(1) That you study instructions with care; (2) that you use the detailed index at the back of the book to complete your knowledge. For instance, if you wish to build a wardrobe, study first chapters, "Making a Joint" and "Making a Glued Joint." Make a few notes. Practice a little, then you will be ready to commence. Next, *plan your job*—preferably on paper. *Always plan.* Then, with clear-cut ideas of what you intend doing, go right ahead. If you decide to stain the wardrobe, read chapter, "Staining and Polishing"—to paint it, read "Painting Indoors," "Enamelling," etc.

NO end of jobs can be done if you use this book and index carefully. This applies to the outdoor work as well. You can construct sheds and garages, fowl houses, seed frames, garden furniture; make concrete paths, steps, walls, etc., provided always that the directions have been carefully studied first.

Same with repair and maintenance jobs whether soldering a leaky joint, mending broken windows, or the complete painting of a house.

This edition also shows you how to increase your efficiency with tools—how to use them correctly and look after them.

Consult this book regularly and it will surely reward you liberally in better workmanship, fewer mistakes and a keener enjoyment of your hobbies and handy-work.

CONTENTS

Painting The Home 6

Removing old paint—Preparing the surface—Painting galvanised roofs.

Painting Indoors 11

Preparing the surface—Commencing the job—Using oil-bound distemper. Use of oil paint—Painting bathrooms and kitchens.

Mixing Your Own Paint 19

First steps—Thorough mixing essential—Paints for different classes of work—Mixing roof paints.

Useful Painting Hints 25

Difference between paint and enamel—Brightening furniture — Storing brushes—Painting ceilings, etc.

Staining and Polishing 30

Mixing your own stains—Getting the desired effects—Using ready-made stains—How to French polish.

Modernising and Lining Rooms 32

Types of wallboard—Pulpboard wallboards—Using Gibraltar board—estimating quantity required—How to work the ceiling.

How To Paper Your Rooms 44

Measuring the room—Cutting and pasting the paper—Matching the sheets—Papering a ceiling.

Built In Furniture For Comfort 48

Points to consider—A dining room sideboard—Compact fitted wardrobes—Built-in bookcase.

Curtains For The Home 56

Hanging your curtains—Making pelmets.

Electricity For The Home 59

Modern appliances—Repairing electrical apparatus—Repairs to lights—Repairing fuses.

Building Your Own Garage 63

Laying out the job—A garage for the "baby" car—Erecting the walls——Making the doors.

Looking After Your Tools 69

Setting the plane—Sharpening chisels—The brace and bit.

How To Solder 76

Starting the job—Equipment you need—Heating the iron Gadgets worth making—Efficient soldering.

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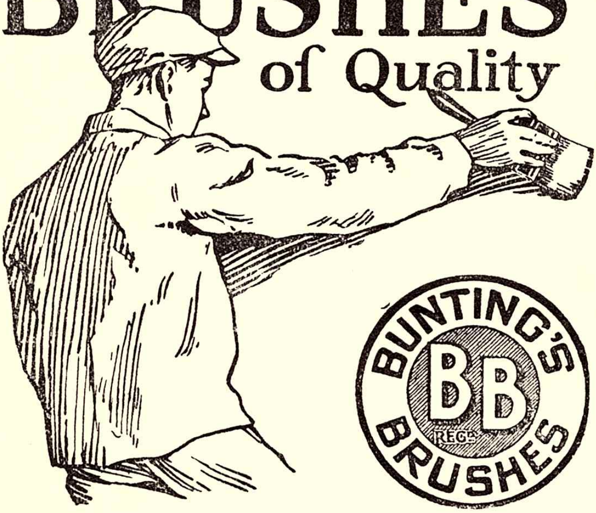

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Joints You Will Use 80

The halved joint—The mortise and tenon—The common dovetail—The use of dowels in jointing.

Making a Glued Joint 85

Preparing the wood—Testing for truth—Heating the glue—How to apply glue—Successful jointing.

A Home Work Bench 87

Essential for good work—Strong and easily made.

Outdoor Furniture You Can Make 89

Handsome garden seat—Useful garden table—Foot mat for seat—Simply made outdoor seat.

Furniture For The Home 94

Modern bedroom furniture—Beautiful corner bookshelves — Light occasional table—Different styles of bookcases—Making nests of tables—Simple corner wardrobe—Table for the "bach"—Vegetable storage rack—Shaving cabinet—Kitchen stool—Folding ironing board—Household steps—Clothes horse—Clothes airer—right-of-way gate—Making a ladder.

How To Make and Mix Concrete 121

Carefully measuring materials—How to mix concrete—How to make and remove forms.

How To Make Concrete Paths 125

Setting out the path—Making the sections—How to avoid cracks.

Making Concrete Steps 129

Different types—How to construct forms.

Building Concrete Walls 131

Points to avoid—Making walls safe—Different types of foundation.

Making Concrete Fence Posts 136

Different styles of post—How to use reinforcing—Making strainer posts—useful hints.

Building A Concrete Septic Tank 143

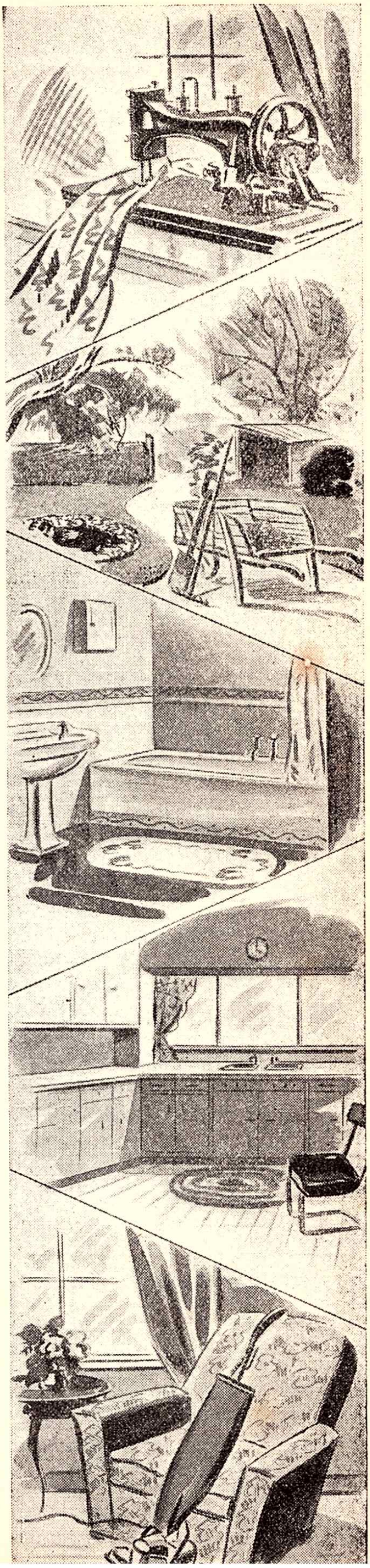
Size of system needed—Preparing the outlet—How to construct—plans and details.

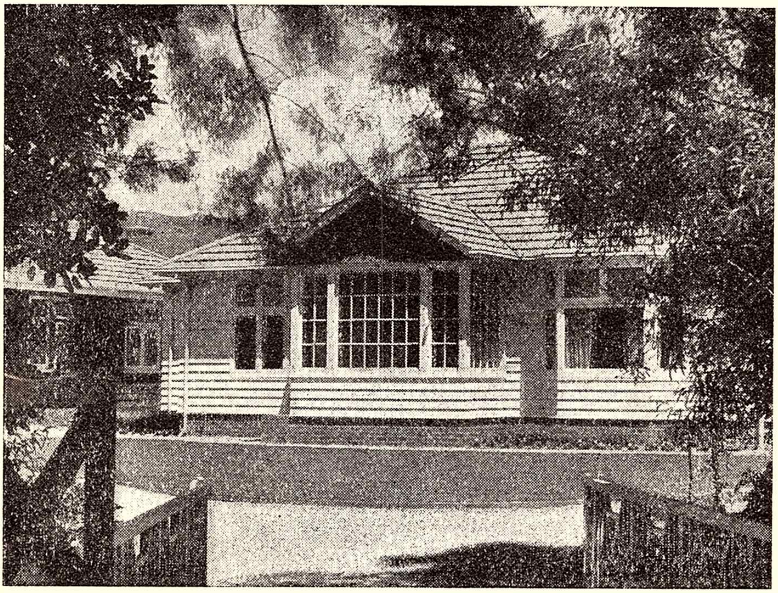
Making Concrete Tanks and Troughs . . 147

Mixtures to use—Method of making.

Installing Electric Plants 149

Special Home Section 150





Painting The House

THE painting of the house and the farm buildings are essentially jobs which can be carried out without any special degree of skill being required, provided care is taken in the preparation of the surfaces to be painted, and good quality materials are used. With very little practice, skill with the paint brush can be readily acquired, and the difficulties and expense of getting the requisite labour in the country can be avoided.

Preparing The Old Surface

THE success of the job will depend largely on the care exercised in preparing the old surface. It is useless painting over blisters. In the case of new sheds, or rooms added on to the house, a priming coat will have to be applied, and in the case of old buildings, a decision will have to be made as to whether one coat or two will be needed. Generally speaking, when the paint is in very bad condition, it pays better to give a couple of coats which will last five or six years.

If the old surface is blistered, it will have to be carefully handled before you paint over it, but if the paint has merely lost its lustre and is a dull matt, instead of glossy, it will provide a good surface for the new paint.

Two Ways To Remove Paint

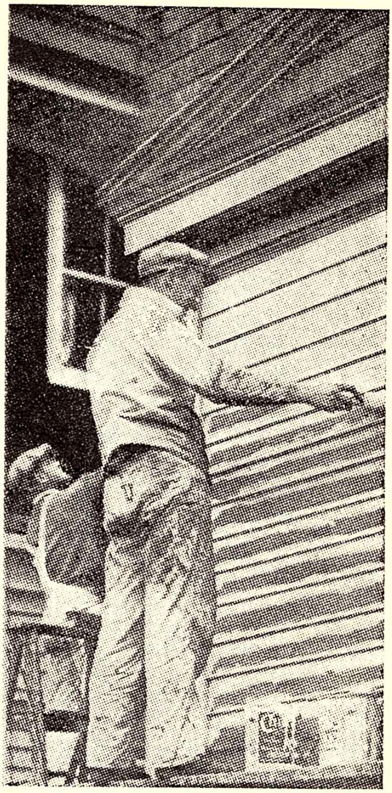
THERE are two ways of removing paint, first by the use of a blow lamp, and secondly with a solvent containing caustic soda or some such substance. The blow lamp method is the best, the flame being applied gently to the surface of the paint and moved gradually upward. As the paint softens, it is removed with the knife. The solvents, which soften the paint so that it can be scraped off with a knife, can be purchased at any paint shop. They are easy to use, but have rather an unpleasant smell. It is essential to wash the work down thoroughly afterward with turpentine or other spirit, for if the whole of the substance is not removed, it will cause damage to the new paint. If you have only a limited amount of paint to remove, the solvent method will probably be the easiest, but **be sure to wash down thoroughly with turpentine afterward.** Mineral turpentine, which is less expensive, can be used for this. Bergers "Solvoid" is excellent for the job.

The ideal material for washing down paint inside the house is painter's sugar soap, obtainable from any hardware store or paint merchant. Mix it according to the directions on the package, and be sure to wash down well with clean water after using it. Painter's sugar soap makes a strong solution which is a great enemy of dust and dirt and is ideal for cleaning down all old paint surfaces.

Mixing Your Own Paint

WHEN you are doing the work yourself it really does not pay to mix your own paint. You can save very little in actual cost, and you cannot hope to do the job as satisfactorily as the expensive machinery used by the paint manufacturer. It is not an economy to buy cheap paint. There are many first-class brands on the market today, and it is a waste of effort to put low-grade paint on your building. It is always cheaper to buy paint in quantities, so calculate out the quantity you will need (a really good paint should cover about 800 square feet per gallon with one coat) and then purchase the paint in bulk.

The Start Of The Job



HAVING removed any old or blistered paint which will interfere with your new work, the best plan is to go over the whole surface carefully before actually commencing the painting. Stop up with putty any nail holes which are showing, also any cracks in the wood, and if necessary, replace any boards that have rotted. Here and there a little sand-papering may be necessary to improve the surface. Clean out the gutters carefully, and before actually commencing the painting of the house, give the interiors of these a couple of coats of paint composed of red lead and oil with a little driers (terebine) added. If the paintwork is dusty it will be advisable to wash it down with a little sugar soap, and after removing the dirt, see that it is thoroughly washed with clean water.

Painting Galvanised Iron Roofs

IF you want to make a satisfactory job of an iron roof which has not been painted for some time, it will be necessary to obtain a wire brush, and carefully brush off all flaked paint. Needless to say, this work should be done right at the commencement of the job so that paint particles will not be blown down on the newly-painted walls. For galvanised roofs an oxide paint is required, and red is much the cheapest. For many years green paints for iron roofs were not satisfactory and did not retain their colour, but to-day it is possible to obtain first-class green paints, which will retain their colour, which will give an excellent finish and will hold their colour for years. When buying roof paint see that you secure a reputable brand. Cheap roof paints flake off after a time.

Painting Farm Buildings

ON the whole, farm buildings in New Zealand are neglected so far as paint is concerned. Besides greatly improving the appearance of the farm generally, expenditure on paint regularly will ensure long life to sheds, stables, etc. Chocolate is a good colour, and being an oxide paint is relatively cheaper than the white lead

How To Estimate Paint Quantities

(Instructions apply to B.P. Quality Paints)

One gallon of B.P. properly worked out on the brush will cover 850 square feet or more, one coat, according to the condition of the surface to be painted, or 425 square feet, two coats.
To find the quantity required, measure the distance around the building, and multiply by the average height—the result is the total area. Divide this number by 425 (the number of square feet B.P. covers two coats to the gallon on the average surface) and you have the number of gallons required. If one coat only is needed divide by 850.
Window shutters, verandahs, floors, ceilings, roofs, etc., will need calculations for themselves in the same way.

MONEY-SAVING FACTS ABOUT HOUSE PAINT

When you buy paint to beautify and protect your home, don't let "low price" blind your good sense. Thousands of home owners are bewailing a "cheap" paint job this very minute and paying the penalty in hard cash. "Cheap" paint is made of cheap or skimpy materials, possibly, and in all probability merely mixed with imperfect mixers in lieu of being "ground" by suitable mills, otherwise it could not be sold at a low price in the highly competitive markets of today. Cheap, skimpy materials make a poor grade of paint, for the life of paint depends on the quality of materials, the balance of pigments and liquids, and the quality of the grinding.
Some people think that B.P. house paint is an expensive paint because it costs more per gallon. That is not so. B.P. is the least expensive house paint on the market, because an average gallon of B.P. will properly beautify and protect 425 square feet of your house—two coats.
The best you can get from an average gallon of "cheap" paint is a meagre 250 square feet—two coats. In that 70 per cent. greater coverage—in the fewer gallons of B.P. needed—the difference in price per gallon disappears. On the job—in actual gallons needed to paint your house, B.P. paint costs no more than the "cheap" low price kind. And remember this, it costs less to put on good paint than to put on "cheap" paint.

THINNING RECOMMENDATIONS FOR B.P.

REMEMBER FIRST COATS MUST DRY WITH UNIFORM PARTIAL GLOSS

SURFACE.	FIRST COAT.	SECOND COAT.
NEW WOOD—Ordinary Timber.	Prime with **B.P.** Primer.	**B.P.** as it comes in the tin.
NEW WOOD—Difficult Timber, such as Totara, etc.	Prime with Totara Primer as per instructions on tin	
REPAINTING—Old surfaces which have not been painted for a number of years.	1 gallon **B.P.** 1 to 2 quarts Raw Linseed Oil. 1 pint Pure Turpentine.	
REPAINTING—Old timber which has become extremely porous through exposure.	1 gallon **B.P.** 7 pints Raw Linseed Oil. 1 pint Pure Turpentine.	
REPAINTING—Surfaces where the old paint is chalking and weathering but otherwise in fair condition and not unusually porous.	1 gallon **B.P.** 1 pint Raw Linseed Oil. ½ pint Pure Turpentine.	
REPAINTING—Surfaces where old paint still carries a high gloss and has considerable life such as under eaves or other unexposed surfaces.	1 gallon **B.P.** 1 to 1½ pints Pure Turpentine.	
THREE-COAT THINNING INSTRUCTIONS. (Most desirable specifications for new wood)	FIRST COAT—Same as above for two-coat work. SECOND COAT—1 gallon **B.P.** 1 to 1½ pints pure turpentine. THIRD COAT—**B.P.** as it comes in the tin.	

Once your house has been painted with B.P. your saving has only begun. A beautiful B.P. job outlasts any "cheap" paint by years. It dries to a firm, elastic, glossy surface. It weathers slowly. There is no cracking or chipping or peeling if properly applied. Long after a "cheap" paint job has disappeared you can wash the dust off a B.P. job with plain soap and water and the colours will come up fresh and bright.

base paints. A very cheap substitute for paint for farm buildings, and one which has certain advantages in that it preserves the wood against dry rot and borer, is creosote. This is a by-product of tar, dries a dark blackish brown when applied to unpainted wood, and sells for about 3/- a gallon in quantities. On any job considerably greater quantities of creosote will be used than of paint, because the creosote penetrates deeply into the wood. It is sometimes used also for houses, but is really not as satisfactory as paint for these.

Another paint which possesses specially useful properties so far as iron roofs, etc., are concerned, is bitumen paint, and as this is relatively cheap, it also appeals to many farmers for use on their farm buildings. You should be certain of getting hold of a really good brand when you buy bitumen paint.

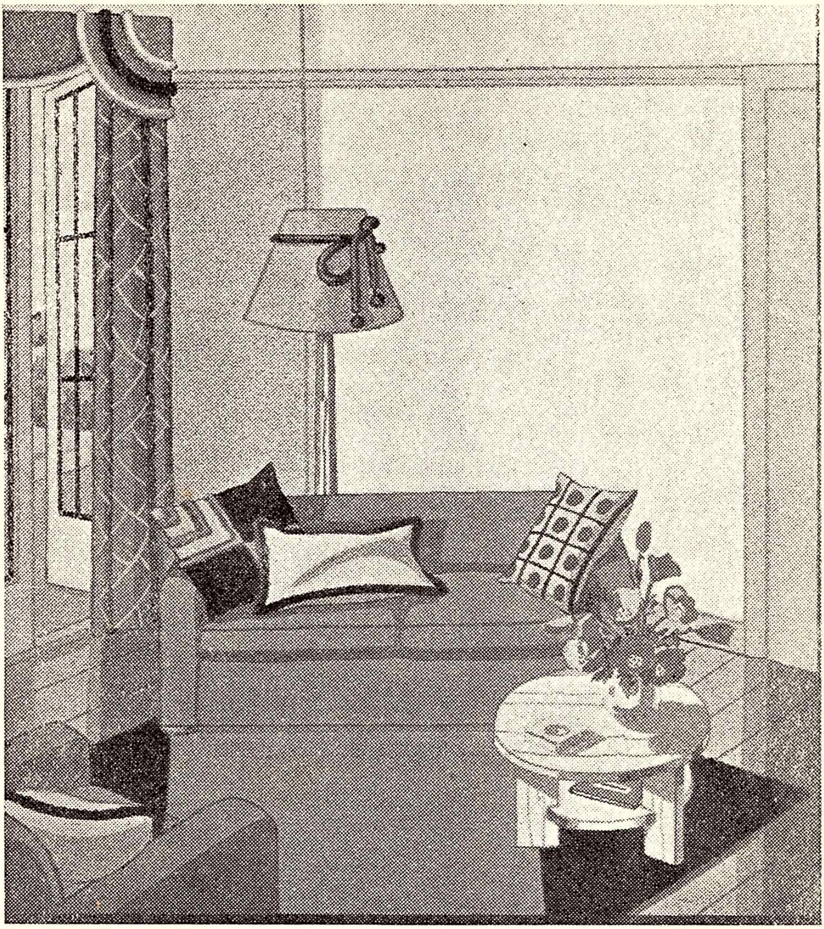
"Box" Your Paint Well Before Using.

IT is essential to thoroughly mix bought paint before you use it, for no matter how good a product it is, some of the heavier ingredients will have sunk to the bottom before it reaches you. The best results are secured by pouring off a quantity of the liquid, and stirring the remaining contents thoroughly. Then the liquid you have poured off is returned gradually, while you still keep stirring. Finally, you should pour the liquid from one contained to the other (boxing) at least twice, by which time you will have a paint of fine, even consistency.

Working Between Two Ladders Is Ideal.

AS a general rule you will be working from a ladder, but if you can work between two ladders with a plank between them, you will be able to keep going longer at a time. Begin at an upper corner and try and finish at another corner or window to avoid laps and streaks. Always complete one coat on the whole house, and let it dry thoroughly before applying the second coat to any part.

* * *



Painting Indoors

THE whole appearance of the interior of a house can be altered at small cost by the artistic use of the right types of paint in different rooms. Elsewhere instructions are given as to how to renovate rooms by the use of wallboard, wallpaper, etc., so we will confine ourselves here to brief instructions as to how to achieve effects with paint, and what paints to use. If you are reasonably good with your hands, you can redecorate the rooms in your house and make it both comfortable and modern.

Thorough Cleaning First

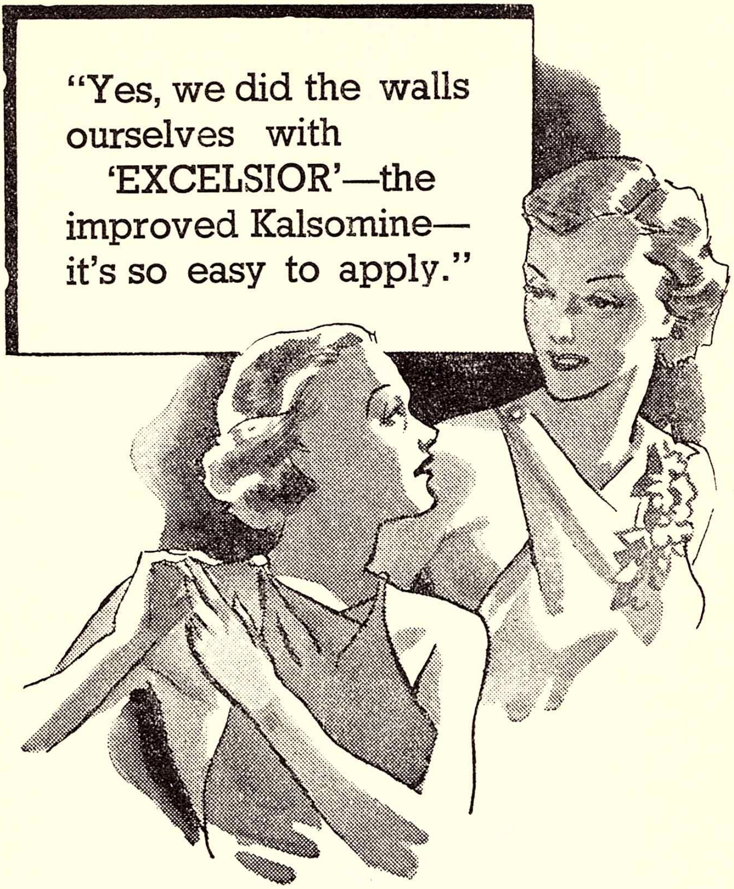
WHATEVER paint you intend using, and whatever the room you are renovating, the first essential is to give it a thorough cleaning so that you will be painting over clean surfaces. Just what you can do will depend on the surface of the room. If it is a papered bedroom which you want to distemper, you cannot wash the walls as you can in the case of a kitchen or bathroom with wooden walls. Do the very best you can, as much of the final result will depend on this work. In the case of a papered room, rub the paper down carefully with clean dusters, and wash the woodwork; where the walls are wooden ones, clean them thoroughly with a solution of warm water in which some sugar soap (obtainable from any hardware merchant) has been dissolved.

MOST people start the cleaning process at the wrong place, by commencing at the top. The correct place to commence washing the painted surface, either a door or a wall, is at the bottom. If started at the top, no matter what cleaning materials are used, you are liable to have trouble with spots and marks, through some of the material running over the uncleaned surface and leaving a stain. An old distemper brush is an excellent thing for washing down a painted wall. Don't attempt to wash down old distemper; it is much easier to re-distemper. Practically always where distemper is washed down, marks are left on the ceiling which the next coat will not properly cover.

MANY charming effects can be secured for a cost of a few shillings per room, with ordinary distemper, which can be used over the existing wallpaper, provided there is not too bold or dark a pattern. The pale pastel shades which are achieved with this medium are particularly suitable for bedrooms, and the work of application, being light, is suitable for a woman to do. At a cost of from three to six shillings a room, prepared distemper can be purchased in packets, and a wide range of shades is available. See that the mixing directions (which vary a little according to the brand) are closely followed. Apply with a special distemper brush. There are many brands of distemper that will give good results, one which has stood the test of time for years, and of which we have had personal experience, being "Excelsior." It is available in a variety of pleasing pastel shades, particularly suitable for bedrooms and living rooms. Used on modern wallboards it gives the type of finish which is so much admired today. Kalsomine and distemper are the same thing.

How To Do The Job

AS it is practically inevitable that a little of the distemper will find its way down to the floor when you are doing the ceiling, cover the floor with old newspapers for a start then *do the ceiling first*. When you are ready to start on the walls, commence from a top corner and paint downwards. The best way is to take the wall in strips about eighteen inches to two feet wide. Start at the top, painting down to the skirting board, always with *vertical* strokes. If you try and brush horizontally, the distemper will have a ruffled surface. It is a mistake to have too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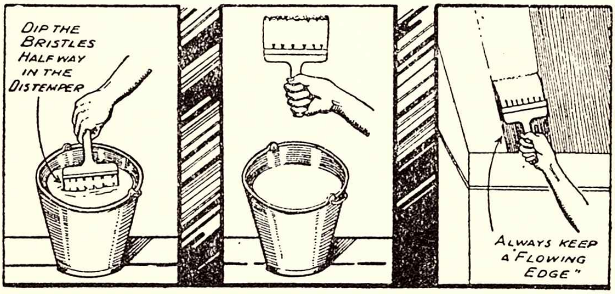
small a brush, the ideal being one about 6 inches wide. Use your brush fairly full, and "flow" the distemper on to the wall, using the tip of the brush only. Make no attempt to brush it out or heavy brush streaks will become visible. Remember that distemper has a good deal of solid matter in suspension, so that it is essential to keep it thoroughly stirred all the time. If you don't, you will find that the colour varies where the distemper is thin. A smaller brush is necessary for working near woodwork, such as window frames, doorways, etc. It is a good plan also to have a piece of damp sponge handy so that you can at once wipe off any distemper which accidentally goes on to wooden surfaces.

Using "Oil-Bound" Distemper

IF you wish to have a wall which can be washed down when required, you will have to use an oil bound distemper. To-day there are a number of different brands of what are known as "oil-bound" distempers on the market which have the advantage that, some little time after application, they can be washed if necessary. These washable distemper paints are manufactured under various trade names, and your paint dealer will be able to give you information about them.


DIP THE BRISTLES HALF WAY IN THE DISTEMPER
ALWAYS KEEP A "FLOWING EDGE"

They are a little more expensive than ordinary distemper, but, even so, are cheap to apply, and they give a satisfactory result which will last for years. We have seen walls which have been painted with oil-bound distemper, and, after six years, there was no sign of any flaking. These distempers are purchased in tins, and all that is needed for use is the addition of a small quantity of water, and some stirring. If you want to make a really satisfactory job of a room, and to have it last, we recommend oil-bound distempers. You must have the wallpaper in good condition though to make their application worth while.

The Use Of Oil Paint

IT is rarely satisfactory to use oil paints over wallpaper. These paints are more expensive than distempers, and unless the paper is in perfect condition so far as its attachment to the wall is concerned, it will not, after being painted, last long enough to warrant the use of good quality oil paint.

On the other hand, if the wall is of plaster, or wallboard (and papered walls can be covered first with wallboard and then painted in any desired colour), much more permanent effects can be secured with oil paints than in any other way. There are three finishes possible—glossy, semi-glossy and matt, or flat—the last is really the most satisfactory for rooms, because it gives a softer diffusion of the light.

On wallboards which are being painted for the first time, it will be necessary to use a coat of priming, which should be coloured to correspond roughly to the colour of the final coat. Buy good quality paint of the type you want. It is not worth while to mix your own, for in most cases the quantities needed are small, and you cannot get the same finish or quality into the paint as the manufacturer in a big way.

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Extremely effective colour contrasts can be secured for all types of rooms, and, with wallboards, artistic effects can be had by painting the battens which cover the joins a different colour. Thus, in a bedroom which you were painting cream, the facings and the battens could be of apple green. Similarly, if you use a flat paint for the walls, you can vary the scheme by using glossy or semi-glossy on the woodwork. A coat of priming and one additional coat will give a good finish with wallboards of the type used in bedrooms.

Painting Bathrooms And Kitchens

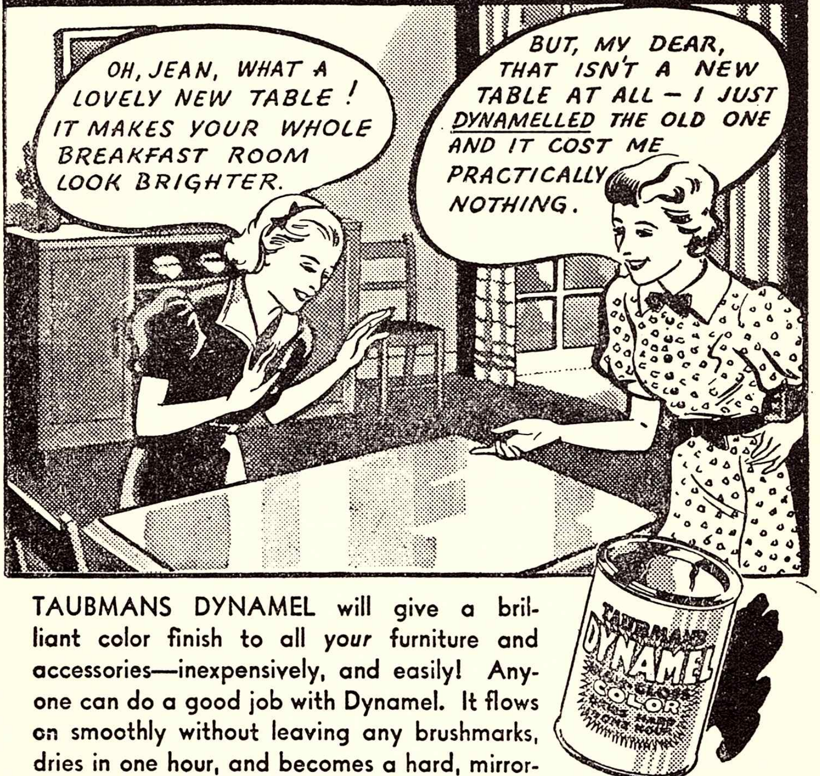
THE majority of kitchens and bathrooms in old houses were finished with matchlining which has a tendency to open up after some years. Modern kitchens are usually finished off with compressed fibre wallboards known as "hard boards" (see page 36) and these lend themselves readily to treatment with enamels. These enamels, while expensive per gallon, have a great coverage and long life, so that their use in the most used rooms of the house is justified. It is essential, before applying them, to have the existing paintwork in perfect order. This can be achieved by careful rubbing down with waterproof glass-paper used with plenty of water. In the case of new work apply the correct priming for the paint you intend using (the new finishes demand care in this respect, but your paint merchant will be able to advise you there) and then follow it with the enamel. Modern enamels, particularly those of the quick-drying type, if evenly "flowed" on to a wall, are easy to use and do not show brush marks. If you have never used them before, try some out on a small piece of board until you find just how to brush them on; once you get the knack it is easy. These modern synthetics which include brands such as "Dulux" and "Dynamel" have a chemical composition quite unlike that of ordinary paint, and it is therefore essential to use them strictly in accordance with the maker's instructions.

When modernising and painting your kitchen you will probably be thinking of installing one of the new, modern, "Champion" or "New World" gas ranges, which represent such a wonderful advance on old gas ranges. If so, you will be wise to decide on your "Champion" colour scheme, and then select paints for your walls that harmonise. The "Champion" colour ranges are green and cream, blue and cream, red and cream, and orange and cream, so you have a wide choice which will allow you that ideal, a kitchen in which everything, including the gas range, harmonises for colour.

Staining Floors Of All Sorts

WHEN you are doing up rooms, it is essential to retouch the woodwork round windows, doors and floors if you are to get the full benefit of the work. If the woodwork and the floors are already stained, they can be freshened up by the use of knotting (which is a mixture of shellac dissolved in methylated spirits). This can be purchased very cheaply, and is best diluted a little by the addition of some methylated spirits. It is surprising what a difference can be

MRS SIMPSON TURNS THE TABLE!


OH, JEAN, WHAT A LOVELY NEW TABLE! IT MAKES YOUR WHOLE BREAKFAST ROOM LOOK BRIGHTER.
BUT, MY DEAR, THAT ISN'T A NEW TABLE AT ALL — I JUST DYNAMELLED THE OLD ONE AND IT COST ME PRACTICALLY NOTHING.
TAUBMANS
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COLOR

TAUBMANS DYNAMEL will give a brilliant color finish to all *your* furniture and accessories—inexpensively, and easily! Anyone can do a good job with Dynamel. It flows on smoothly without leaving any brushmarks, dries in one hour, and becomes a hard, mirror-bright washable surface.

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made to the appearance of a room if the woodwork is freshened in this way.

There are several ways of making a satisfactory job of floors which have not previously been stained. If you want a light stain, mix a little burnt sienna (a 1lb. tin costs about 1/6 and will be more than enough) with raw linseed oil, and rub well into the wood. Then, when the oil has worked well into the wood, cover with knotting. Two coats, the first thinned down a little with methylated spirits, will give a specially good job.

If a dark stain is required you can mix a little permanganate of potash (it costs about 9d. an ounce at a chemist's, and an ounce goes a very long way) with water, when you get a deep purple-looking stain. This, when applied to wood, turns a deep brown. The best way to make sure of getting the exact shade you want is to try it out on a piece of wood first. Then you can apply knotting in the same way.

Prepared Stains For Floors

IF you don't want to go to the trouble of mixing these preparations for yourself, you will find many excellent floor stains on the market which combine the stain and the knotting, and from which you can get any desired colour. Have the floors very clean when you apply, and sandpaper where necessary to secure an absolutely smooth surface. These prepared stains cost only a few shillings a quart, and they provide a tough surface which wears well.

One should mention here, also, the specially-prepared floor paints which, used nowadays in bedrooms to give delightful colour contrasts, are both beautiful and durable. They are in dull shades so as not to detract from the wall colours. Brands we have used and found to be really tough, high quality floor paints are Taubman's "Solpah," and Bergers "Florcote." These paints are excellent, too, for transforming old linoleum.

Mixing Your Own Paint

THIS chapter has been added to the second edition of this book because of numerous requests for information on this subject. Broadly speaking, the advice given in the previous chapter, that it is hardly worth while bothering to mix your own paint when you are doing the job yourself, is sound. On the other hand, it sometimes happens that for reasons of transport, or because you intend to do a big job or perhaps to renovate the house inside and out in various colours, that the buying of the necessary pigments, oil, etc., will be cheaper. This section, therefore, gives full details of the mixing of various types of paints from the very best materials. The approximate quantities of the different materials are given, but it is necessary to add that you must be guided to some extent by the thickness of the paint and its spreadibility. White lead varies a little, and so does linseed oil, and both will be affected by whether the weather is intensely hot or very cold. What you should do, therefore, in following out these directions, is to mix according to the directions given, then try out the paint, and if you find that it is too thick, add a little more oil, and if too thin, add a little more of the pigment.

Painters disagree on a good many points about paint, but on one they are practically all in agreement; the best paint is made from pure linseed oil and white lead. There is some argument in favour of using a little zinc oxide with the other ingredients for the finishing coats, but for the ground coat, white lead is best. This applies to white paint, and all the tinted colours, but does not apply to dark browns, chocolate or dark red paints, which are made from different materials.

White Lead Paint Has Outstanding Qualities.

WHITE lead paint is the most expensive to make, but lasts longest, and this applies equally to paint used on exteriors and interiors. If you add either raw linseed oil or boiled linseed oil to white lead (which you buy in paste form) the subsequent paint will have a glossy finish. If you require a paint with a matt finish for interior work, say for bedroom walls, you will use turpentine with the white lead. If you require an enamel for a bathroom, you will mix a good quality varnish with white lead, and you will have one with a very high gloss. In practically every case you will have to use a small quantity of terebine or "driers" so that the paint will dry in reasonable time, but provided you use only the limited quantities recommended here, it will not noticeably affect the glossy quality of your paint.

The great advantage of white lead as a base over all others is that it gives a white paint that is very opaque, which covers a surface well, and which lasts a long time. Its principal disadvantage is that after a time it has a tendency to chalk. When a white lead painted surface has reached the repainting stage, it has seldom to be burned off, as cheap paints so often have to be. The chalking-off tendency of white lead paint can be overcome by adding 10 to 15 per cent. of zinc oxide to the lead for the second and top coats if three coats are being given, or to the second coat if there are two coats. It is unwise to add the zinc oxide to the undercoat.

Very Thorough Mixing Is Essential.

IF you buy a prepared paint, you will almost invariably find that the maker has stressed the need for very thorough stirring before use. He will probably recommend you to pour off about half the oil at the top, into another tin, then stir very thoroughly, and gradually add that oil back again. The result you will get with that paint will depend upon how faithfully you have carried out his instructions. To a very much greater degree, carefulness of mixing is needed if you are going to make your own paint from the raw materials. If, for instance, you intend mixing sufficient paint to do the whole of your house, you will have to spend some hours in mixing together the various materials; if you do not do so, the paint will be lumpy, or thin at the top of your tin, and thick at the bottom, and the result will be an unevenly painted surface. No matter how finely ground the white lead has been, it will take time to thoroughly incorporate it into the oil, and the time you spend in doing that, is going to make or mar your job.

How To Mix White Lead And Oil.

WHITE lead in paste form is made up in containers of various size, 14lb., 28lb., 56lb. and 1cwt. kegs, and you can estimate the quantity you need from the information given later. The way to mix it is as follows: If you are mixing only two or three gallons of paint, put the whole of your lead into an empty linseed oil drum, or benzine tin, then pour in about a quart of linseed oil or turpentine, according to the type of paint you are making. Stir the lead paste until the whole of the liquid has been taken up into it, then add another small quantity of liquid, and repeat the process. Keep on adding small quantities of the liquid until you have about half of it incorporated with the white lead, and then mix steadily until you have got rid of all the lumps. It is very much easier to get all the lumps out of the paint, and get it properly and thoroughly mixed at this stage, than it is later on when more oil has been added. At this stage, too, it is a good time to add the terebine or driers. Remember, the whole success of your job depends on the way in which you mix the oil and lead, so be sure to make a very thorough job of it.

That mixing gives you a white paint. If you want cream, or some other colour, it will be necessary to mix your tinting colour with a little turpentine and add it when the white paint has been completely mixed. Add it slowly and carefully, mixing it well in to make sure that you don't add too much. You can always add more, but if you want a light cream, and add too much yellow ochre, you will get a deep cream or a yellow paint, and will have to add quite considerable quantities of white paint to bring the colour back, and then perhaps have a lot of paint on your hands, of a colour you don't really want. Use tinting colours ground in oil to paste form, rather than dry powdered colour. Each batch of colour added to the white, should be stirred thoroughly, and the paint should be tested by brushing a little of it out on a board. The colour of paint always looks darker in the pot than when brushed out. If you notice little streaks of darker colour when the paint is brushed out, your mixing has not been sufficiently thorough.

After your paint has been thoroughly mixed, leave it overnight. You will find in the morning it has thickened up a little, and you can add a little more oil. Then strain it carefully through cheese-cloth or a fine paint strainer. This will remove any small pieces of skin which were in the paint, and make it brush more freely. This straining business takes up some time, but is well worth while.

Quantities Of Lead And Oil.

ANYONE who gives a little thought to the matter will realise that it is not possible to state offhand quantities of white lead and oil suitable for all types of wood and all types of painting. Some woods, such as white pine, will be much more porous than woods such as heart of rimu, and the more porous the wood, the greater will the oil film need to be. The mixing formulas which are given in this section are standard formulas which have proved themselves over many years and they are as accurate as can be given for average conditions, but they must be varied a little to suit the particular conditions of the weather or the job, and the final test is always as to just how the paint brushes on. The best way of trying out is to get a smooth board and use a brushful of paint to see how it works. If the surface to be painted is an outside wall on which the former paint has chalked, your paint will need a little more oil, and a little less lead, but if it is hard and the surface well filled, you will need less oil and slightly more pigment.

If you are making a flat paint, for indoor use, you will find that it takes much less turpentine than linseed oil to bring white lead to brushing consistency. For instance 1cwt. of heavy paste white lead will take up 3½ to 4 gallons of linseed oil and 1 gallon of turpentine before it is thin enough for a dry and porous surface, while the same amount of lead will take up only 2½ or 3 gallons of turpentine to bring it to brushing consistency.

Standard Formulas For White Paint

New Outside Woodwork.—First Coat.

1 cwt. pure white lead
4 gallons pure raw linseed oil
1 gallon pure turpentine
1 pint terebine (driers)
(Above quantities make 8 gallons of paint.)

New Outside Woodwork.—Second Coat.

1 cwt. pure white lead
1½ gallons pure raw linseed oil
1½ gallons pure turpentine
1 pint terebine (driers)
(Above quantities make about 6½ gallons of paint.)

New Outside Woodwork.—Third Coat.)

1 cwt. white lead
3½ to 4½ gallons raw linseed oil
1 pint pure turpentine
1 pint terebine (driers)
(Above quantities make 7 to 8 gallons of paint.)

As mentioned earlier in this chapter, for the final coat, from 10 to 15 per cent. zinc oxide can be used if desired. It has the advantage where near the sea that the paint will take longer to become chalky than where white lead alone is used.

Old Outside Woodwork.—First Coat.

1 cwt. pure white lead
2 gallons raw linseed oil
2 gallons pure turpentine
1 pint terebine (driers)
(Above quantities make about 7½ gallons of paint.)

Old Outside Woodwork.—Second and Later Coats.

1 cwt. pure white lead
3½ to 4½ gallons raw linseed oil
1 pint pure turpentine
1 pint terebine (driers)
(Above quantities make 7 to 8 gallons of paint.)

Brick, Stucco and Concrete Surfaces.—All Coats.

1 cwt. white lead
4 gallons pure boiled linseed oil
1 gallon pure turpentine
(Above quantities make about 8 gallons of paint.)

Floor Paint.—First Coat.

Certain manufacturers have specialised in the making of floor and paving paints, and we strongly advise the use of such paints as

Berger's Florcote. If, however, you want some special colour not available in ready-mixed floor paint, you can use the formulas given here.

28 lb. white lead.
7½ pints turpentine
2½ pints boiled linseed oil
Tinting colours
(Above quantities make about 2 gallons of paint.)

Floor Paint—Subsequent Coats.

20 lbs. white lead.
6¼ lbs. zinc oxide.
3 quarts boiled linseed oil.
1 quart floor varnish.
½ pint turpentine.
Tinting Colours.

Mix the varnish and turpentine together before adding to the paint.
(Above quantities make about 1¾ gallons of floor paint.)

Red Roofing Paint for Galvanised Iron Roofs.

28 lbs red oxide in oil.
2 gallons pure boiled linseed oil
½ pint terebine (driers)
(Above quantitiees make approximately 3 gallons, sufficient for average roof, one coat.)

Chocolate Paint For Houses and Barns.

It is possible to get dull brown paints from white lead and added tints, but a much more satisfactory chocolate paint, particularly suitable for sheds and farm buildings can be made from a mixture of Indian Red and oils. This has the added advantage of being considerably cheaper to make than lead paint. Here is a mixture which gives a rich, dark chocolate colour.

1 cwt. Indian Red
4 gallons boiled linseed oil
1 pint terebine (driers)
14 lbs. black in oil
(Above quantities make about 8 gallons of paint.)

Red Lead Paint for Interior of Spouting.

A mixture of sufficient red lead powder and raw linseed oil to give a paint-like consistency is invaluable for protecting the inside surface of galvanised iron gutter spouting. Before the roof is painted, clean out the guttering, then apply this paint. No driers are needed.

Whitewash For All Jobs

WHITEWASH deserves to be used much more widely than it is, and so it would be if it were made from recipes that give a material which will not flake off soon after being applied. There is a whitewash for both interior and exterior use which will give really satisfactory results, and the recipes are given here. They can be used with confidence, and, in fact, we have known the interior ones, tinted, used for bedroom decoration quite satisfactorily. The recipe which contains skimmed milk has many of the properties of casein paint, will stick to the surface well, and if not applied too thickly will not flake off at all.

Interior Whitewash

TAKE 62lb. of unslaked lime (quicklime) and 15 gallons of water. Put the lime and water in a barrel and stir occasionally to prevent scorching.

Then take 2½lb. flour. Mix the flour with ½ gallon of cold water, then add 2 gallons of boiling water. Take 2½lb. salt (not iodised) and dissolve it in 2½ gallons of hot water.

Mix the flour paste with the salt water solution and then add the mixture to the lime and water in the barrel. Let stand overnight and strain.

Exterior Whitewash

TAKE 62lb. of unslaked lime (quicklime), and 12 gallons of water. Put the lime and water in a barrel and cover the top of the barrel. Then take 2lb. salt and 1lb. sulphate of zinc, and dissolve them in 2 gallons of boiling water. Mix the salt solution into the lime and water, then add 2 gallons of skimmed milk and stir well. Let the mixture stand overnight and strain carefully before using.

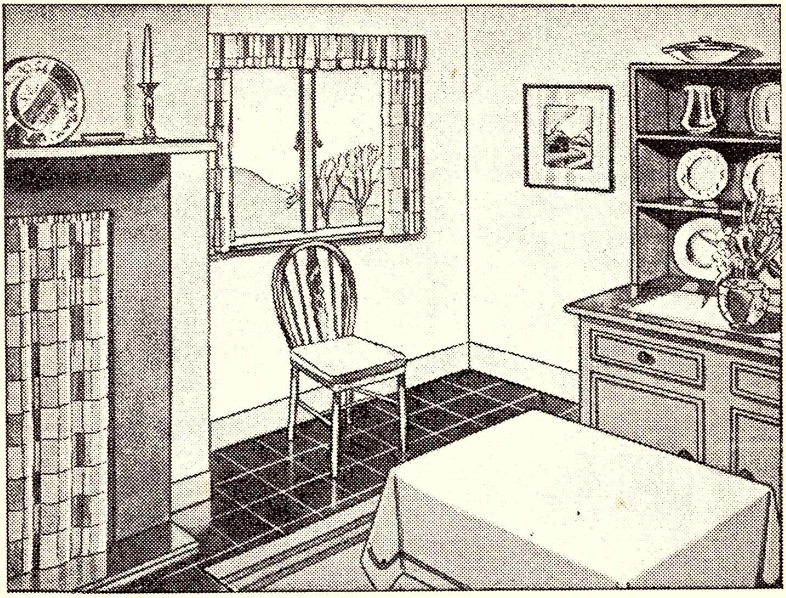
Hints On Using Whitewash

IF it is possible to do so, all the above whitewashes will be better for being applied hot. If you can heat the whitewash in a benzine tin, and keep it hot, you will get much better results.

To prevent whitewash dusting off after a time, it is a good plan to add 1oz. of alum for each gallon of whitewash. Where flour paste is used in a recipe it serves the same purpose, but it is a good idea then to add a little sulphate of zinc as well, to prevent the flour decaying.

You can obtain a glossy surface with whitewash by mixing with it a small quantity of ordinary laundry soap. Flake the soap, then heat till dissolved. The quantity needed varies considerably, but a trial with a board or two will soon give you the gloss you require.

Whitewash may be coloured. The best colours to use are those which are used for colouring cement, but dry painter's colours such as yellow ochre, Venetian red, lampblack, raw and burnt umber and raw and burnt sienna may be added to the whitewash. This needs to be done carefully so that the colour may be thoroughly well incorporated. Chrome yellow, chrome green and Prussian blue must not be used with whitewash as they are adversely affected by alkali.



Some Useful Painting Hints

Buy Good Quality Brushes

SINCE you intend doing the work yourself, you are saving money. It is therefore unwise economy to try and effect further savings by buying cheap brushes. We believe it will pay you to get the better quality article stocked by your paint merchant. Given the small amount of necessary attention, a good brush will last for years. One of the best brands, which we thoroughly recommend, is Bunting's.

For Removing Dust

WHEN you are painting inside you often find that in some of the old-fashioned mouldings dirt will be harboured. Always, before you start, have a brush handy for removing all the dust. An ordinary hearth broom, provided it is absolutely clean, will do the work. Dust is fatal to painting, so an hour or two spent in getting the existing paintwork spotlessly clean is always time well spent, for it saves you money through lessened paint deterioration afterwards. The same thing applies to the outside of your house. Have it entirely free from dust before you start the job.

Rubbing Down Old Paint

TO prepare old paint for the new coat, and to "rub down" in between several coats where a new house or addition is being painted, a liberal quantity of sandpaper will be needed. Ordinary sandpaper can be used, but it rapidly becomes clogged. A better plan is to obtain a supply of one of the waterproof sandpapers now on the market. These are always used with plenty of water, which assists their cutting, avoids clogging, and prevents paint dust becoming scattered round. These papers are economical to use, since one sheet outlasts many sheets of the ordinary dry type.

Don't Have Glossy Undercoats

FOR painting to be really successful, it is essential that each successive coat should "key up with," or grip, the surface to which it is applied. In order that this should be so it is necessary that the undercoats should be rough or flat surfaced, and devoid of gloss. Whatever the consistency of the paint, if you apply it to a hard, glossy surface, it will eventually peel off or crack. Thus if your undercoat is too glossy you should add turpentine, which will "flatten" it, giving it a matt surface.

Difference Between Paint And Enamel

DO not be over-anxious to cover the ground quickly, particularly with enamels. The important point with enamel is to deal with only a small area at a time. It is a mistake to overload the brush, and only the chisel tip should be employed. By dealing with small areas only, the enamelled portions are kept "live" so that the next section can flow easily into it without dragging the brush and showing objectionable brush-marks. The brush should just be dipped in about three-quarters of an inch, and any excess of enamel should be removed by drawing it lightly along the edge of the tin. Enamels must be flowed on to the work. Oil paints, on the other hand, should be brushed out.

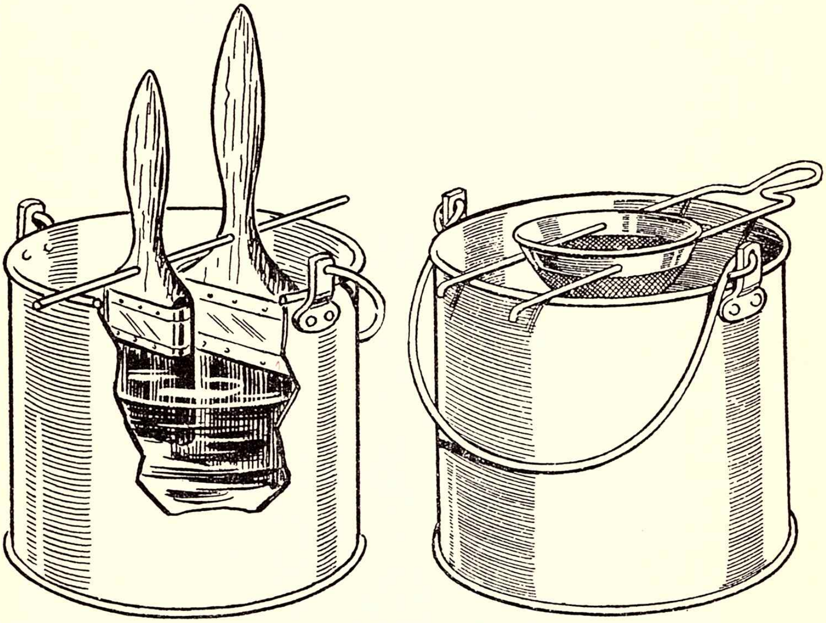
Brightening The Furniture

WITH the modern enamels and brushing lacquers, any amateur can to-day secure excellent finishes on old furniture, provided care is taken. In bedrooms that have been distempered or painted, enamelled or lacquered furniture in harmonious colours completes the picture. Try doing a chair or small table for a start; then when you find you can make a first-class job, tackle bigger articles. If the old paint or varnish on the furniture is badly marred, or is coming off in scales, it should be completely removed, but as a general rule it is sufficient to wash the article well with painter's sugar soap, then cleanse it thoroughly with warm water, and let it dry. Then sandpaper it carefully with a fairly fine paper, giving it a uniform dull surface on which to work.

Those who have tried furniture renovation with Dulux or Dynamel know how easy the job really is, and what excellent results can be secured by the amateur with very little effort. Never apply enamel or varnish over a waxed finish, as the material you use will not dry properly. Wash the wax off carefully with turpentine. Mineral turpentine, which is cheapest, is quite satisfactory for this washing down.

How To Store Brushes

NEARLY all amateurs waste money through not taking proper care of their brushes, so that when, after some months, they come to do a new job their brushes are hard with old paint. Hang your brushes in raw linseed oil if you want to keep them for a time. A stout piece of wire through a small hole in each handle keeps them supported. While they are in use on an actual job they can be placed each night in water. If you will not be using the brush for a long time, wash it in soap and water, then wrap in waterproof paper.



Wicker And Seagrass Furniture Painting

WASH the chair or other article clean with benzine (use an ordinary scrubbing brush), and then paint with one of the specially quick-drying enamels. Faded seagrass chairs can be made to look most attractive in tones of apple green, dull pink, etc., to harmonise with the colour scheme of the room in which they are used.

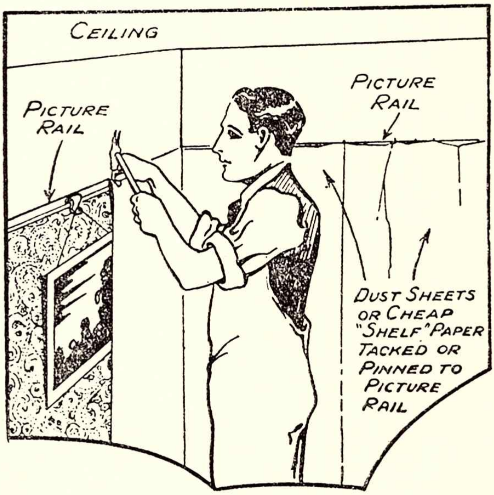
Hint On Priming Wallboards

MOST wallboards are fairly porous, and if the ordinary priming paint is used, large quantities will be needed. It is usually better to buy what is known as a "sealer." If you ask your paint dealer for a "sealer" for priming wallboards, he will give you what you need. This "sealer" gives a non-porous surface to the board, allowing one further coat of paint to give a perfect finish. Otherwise, three coats are sometimes necessary to make a really good job.

Flat Paints Are Best Indoors

IF you experiment with paints at all, you will eventually find that the most satisfactory finish for bedrooms, living-rooms, etc., is a flat paint which allows more light to be reflected from the walls. Moreover, it gives greater eye comfort than ordinary glossy paints for indoor work. This does not, of course, apply to kitchens or bathrooms. There good quality enamel paint will give the best and most lasting results, for it can be more frequently washed down without damaging the paint. Bergers "Matone" is an excellent flat oil paint.

How To Paint The Ceiling


CEILING
PICTURE RAIL
PICTURE RAIL
DUST SHEETS OR CHEAP "SHELF" PAPER TACKED OR PINNED TO PICTURE RAIL

PAINTING ceilings is one of the bugbears of the amateur, but it is easy if you don't fill your brush too full of paint. Dip the brush no more than one-third the length of the bristle into the paint, and keep it well scraped on the edge of the can. That will prevent the paint running down the arms while you are painting. Apply paint in strips 2ft. to 3ft. wide, and don't brush out too much. Just smooth out lightly with fan-shaped, semi-circular brush strokes.

When Is The Best Time To Paint?

IN New Zealand that depends a good deal on where you live, for it isn't so much a question of the season, but as to how much rain is likely. On new buildings and on additions with new timber, allow the wood to dry out well before painting. If some rain falls, so much the better, for it will help to wash out any sap in the timber. Try and have the wood dry right through, not just dry on the surface. The same holds good for old houses. Don't start painting until you are certain that the place is thoroughly dry.

Never paint a wet surface. The paint is certain to peel later on. Avoid painting on cold, damp days, and also during blistering hot weather. Never paint over wood that is frosted. The ideal time for painting is when the weather is warm and dry. Unfortunately, on farms that usually coincides with the busiest time of the year, and is not always feasible. However, by waiting your opportunity, you can frequently paint quite successfully in the winter time, particularly in sheltered positions. In winter time, however, it is advisable to commence painting as early as possible on a fine day, thereby giving the paint a chance to dry before it can be affected by the evening dew.

* * *

Staining And Polishing

NO matter how neatly a piece of furniture may be finished in the original wood, its final appearance depends very greatly upon the way in which the painting, staining, or polishing has been carried out. Just as it is true to say that the final result with furniture you are making yourself will depend on the care you take in putting it together, so is it correct to say that its final appearance will depend on the time you spend in polishing or staining. With many types of work, such for instance as bookshelves which are being built into a room, there will be so little of the actual timber showing by the time the books are on the shelves that it is almost a waste of time to go to any great lengths in polishing. The treatment for those can be found in one of the many really excellent ready-made varnish stains on the market, such for instance as those manufactured by Bergers. This type of stain will be found to serve most of the purposes of the amateur, but for those who want to know how to obtain other effects, and how to get that lovely "French" polish that is always so much admired, the information which follows is given. A point to remember when working with a purchased ready-made stain is to study the maker's directions and follow them closely. These stains are prepared in different ways, and the makers have worked out how they can best be used. You will always get the best results by following their instructions.

The real secret of success with staining and polishing is to have a perfect wood surface to start with. It isn't enough to have planed your wood. After that it should be sand-papered with a fine paper, and for really fine effects, you want to treat it even after that. Mix a little plaster of Paris to the consistency of thin cream, and rub it well into the pores of the wood. When it has had time to set, scrape the surface of the wood with the edge of a piece of glass, or lightly with a steel woodscraper until it is absolutely smooth again. Then give it a further light touch or two with sand-paper, after which it is ready for the stain.

Mixing Up Your Own Stain

MOST paint shops can supply you with powders which, when mixed with water, will give you stains that produce on fairly white woods, effects which are called "rosewood," "mahogany," "oak," etc.—stains which give a light coloured wood, the appearance of one or other of those timbers after treatment. These stains are applied with brush or pad after being dissolved in warm water, and one or more coats given according to the density desired.

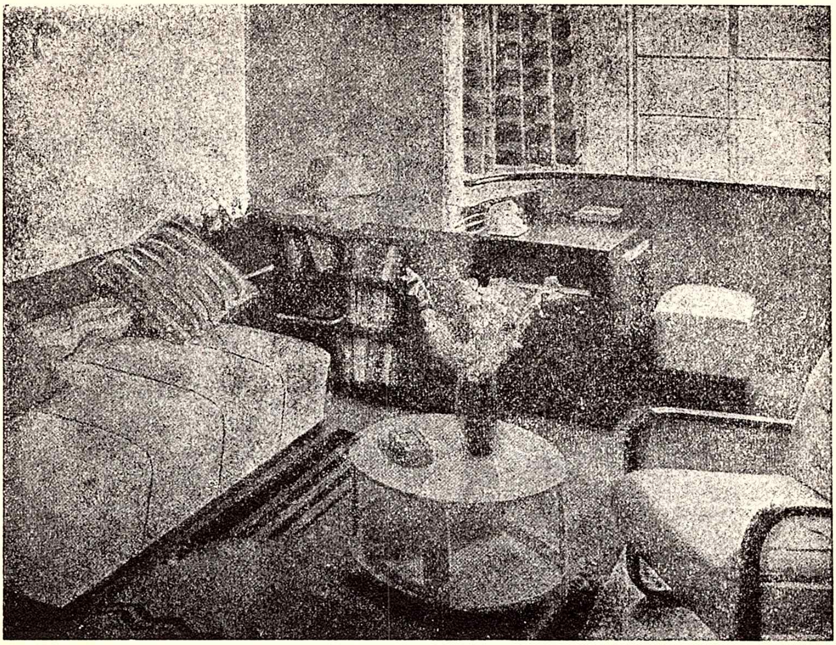
Having done this, you can then leave the stain as it is, unprotected by either stain or varnish, or you can give it a coat of varnish, or you can rub it up with furniture polish, or French polish it. Oak is best treated with either beeswax or furniture polish as it then assumes a pleasant but not too high a polish.

Polish or wax should be applied fairly liberally, and well rubbed in. Success usually depends more on elbow grease than on beeswax or polish. From time to time add a little more wax or polish, and you will find that the wood very quickly assumes a high degree of polish. Heart of rimu works up well, and if it has been treated in the way suggested above, you will quickly get a fine free polish on it.

French Polishing Is Hard Work

THE makers of high-grade furniture who French polish it, usually keep the ingredients of their polish as a trade secret, but while recipes may differ a little, the two basic ingredients of French polish are methylated spirits and orange shellac. The third ingredient is a very considerable amount of energy, and unless you are prepared to put a lot of work into the job, you will be well advised to leave French polishing to others. One ounce of orange shellac and a pint of good quality methylated spirits will give you the mixture you want; you will have to stir the shellac in slowly and stir well until it is all dissolved.

French polish should be applied with a pad composed of a centre of cotton wool over which is stretched a piece of linen or silk. The cotton wool acts both as a pad to assist in polishing, and a reservoir for the polish. Apply only a little polish for a start and work away at the wood until it is all worked in, before adding more polish. Always work along the grain of the wood, never across it. Slowly, the wood will commence to assume a polished appearance, but you may have to work on it several times before it finally assumes the French polished appearance you really want.



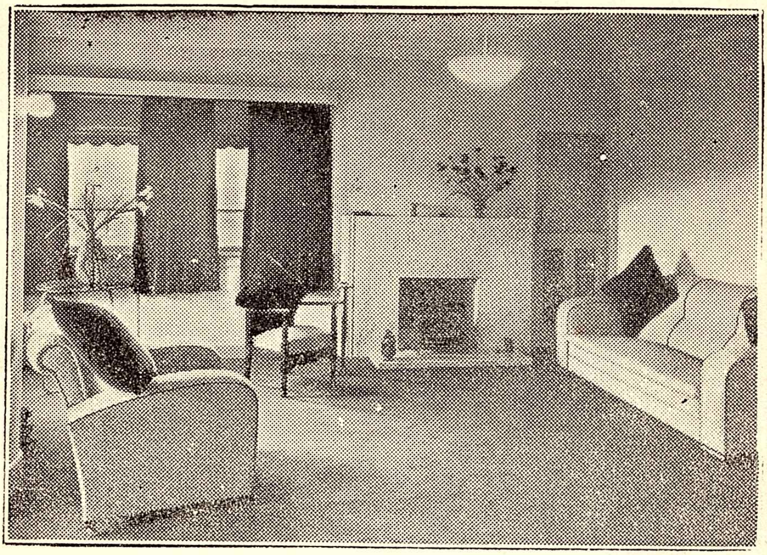
—Photo Courtesy Gibraltar Wall Boards.

MODERNISING AND LINING ROOMS

FEW people realise how cheaply it is possible to-day to completely modernise an old-fashioned room, or to line a whare or unlined room. Because timber costs are so high here, we frequently imagine that home alterations must be costly, but there are so many materials now available at reasonable cost that this is not the case, particularly in existing houses where it is merely a question of lining walls where the studs have not been covered. It is far cheaper to line these with some form of wallboard than to board, scrim and wallpaper them, and, in addition, the result is more artistic and more hygienic in the long run. In the case of rooms which have long been papered, and where it is desired to completely renovate them, the scrim and wallpaper can be quickly removed and wallboard applied to the existing wall.

Several Types of Wallboard.

THERE are several different types of wallboard, each designed for specific purposes. If you intend lining a whare or room where the studs have not previously been covered you need a strong, rigid wall-



The Walls and Ceilings of Every Home Should be of Fire-Resisting
GIBRALTAR BOARD!

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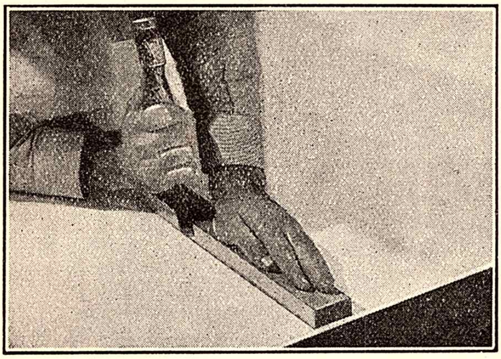
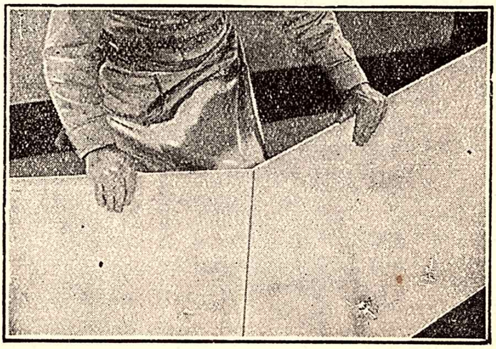
board. The ideal type for this use is Gibraltar Board, which is composed of two tough layers of chip board, encasing a solid Gypsum Pumice composition. This board, which has the advantage of being remarkably fire-resisting, is as solid as rock, will not warp or buckle, and can be nailed in just the same way as ordinary board. It can be cut by the chisel method or by a saw. Being strong and rigid, it can be nailed over bare studs, the board being erected vertically or horizontally. The joints are then either covered with a batten, or plastered to make a complete smooth wall without battens. Gibraltar Board will take any type of decoration and looks particularly well when finished off with flat paint, oil-bound distemper, or enamel paint. It has an ivory-finished surface specially designed to provide a sound base for all interior decorative finishes. It is also very useful for open, and semi-open porch ceilings, because it stands up to the drift from rain, and if given a coat of lead and oil paint is impervious to water. It can be taken for granted that where the job requires the covering of unlined walls, that this is an ideal material. It is available in both $\frac{1}{4}$-inch and $\frac{3}{8}$-inch thickness; in 3ft. and 4ft. widths to suit fixing centres of 18 inches to 2ft. respectively. In the $\frac{3}{8}$in. thickness there is an additional width of 3ft. 4in. to suit 20in. centres., the lengths being 6, 7, 8, 9 and 10 feet.

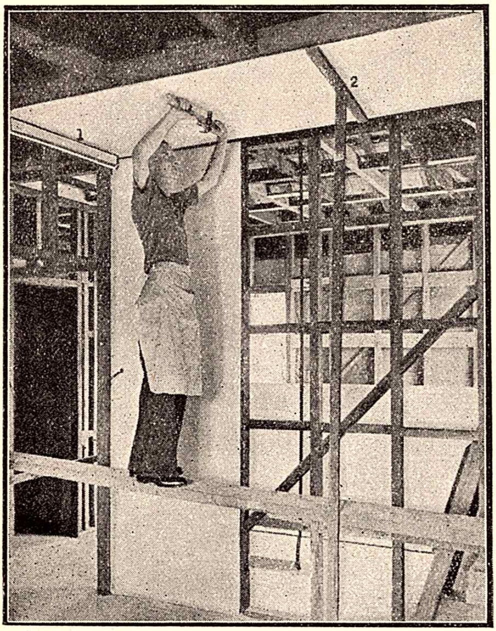


Why ruin your saw? In cutting Gibraltar Board you can make a perfect job by running the chisel along your mark, as shown, scoring into the chipboard cover.



Having scored the Gibraltar Board with the chisel as shown above, bend it across your knee and it will break cleanly and evenly.

Now a few tips on planning the job. This is really simple when the following rules are observed: In fixing any wallboard the easiest way to ensure that both sides of the walls will line up is to use gaged studs for all inside partitions. This is done by planing them to the thickness; when doing this it is always advisable to dress both sides of the studs rather than one side, otherwise uneven tension will result, causing the stud to cast.



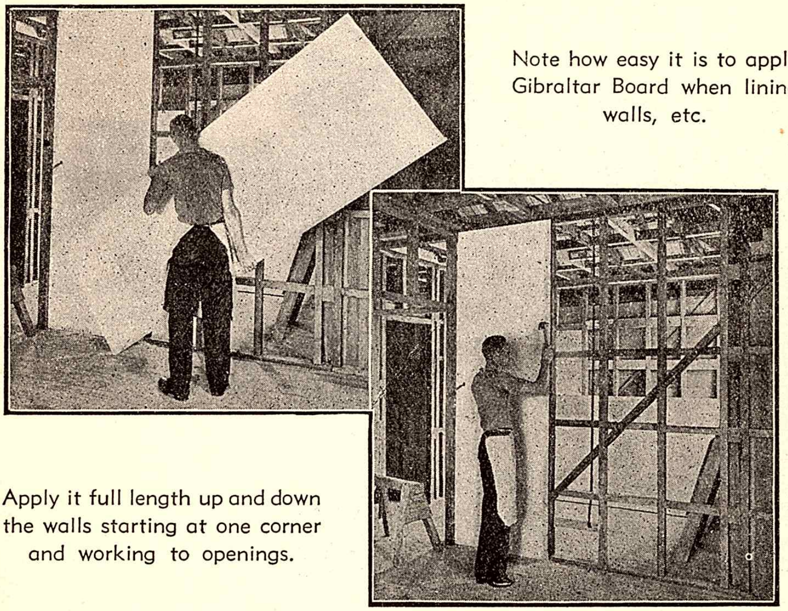
Gibraltar Board is an easy material to use, provided you work it according to the directions supplied by the manufacturers. This shows the method of attaching it to the ceiling, and also the way in which it is used for partitions between rooms.

Remember to set out the studs, joists and noggings, and generally plan the window, door and other openings to suit handy building centres, that is, 18in., 20in. or 2ft. centres, as these will accommodate the standard sizes of wallboard, with the result of no wasteful off-cuts.

When ordering, carefully check all measurements and specify the sizes which will work to the best advantage. A good method is to note the placing of the whole boards first, then the half boards, and, finally, any small fitting pieces, such as above doors, etc., marking the sizes on the studs for the purpose of placing the boards expeditiously at the time of erection. When erecting and decorating any wallboard, follow the manufacturers' instructions, and little difficulty will be experienced.

The manufacturers of Gibraltar Board advise that it should be nailed every four or five inches apart when nailing the edges of the board, and at the centres about nine inches apart. After the first sheet has been erected, leave the thickness of a floor board, or roughly $\frac{1}{8}$in. space, between the edges of each adjacent board, first driving a few nails in the edge of the board where it joins the last, then the centres, then the next edge, and finally the ends. This procedure will ensure that the boards lie flat and even. Never spring boards into position when meeting up, otherwise buckling will be sure to result.

The joints and nail heads may be stopped and filled with Plaster of Paris if a "flush" or smooth wall surface is required, or it may be treated in a most artistic manner by the use of cover moulds, battens, or button bars over the joints if desired. By applying the wallboard in either horizontal or vertical position, very pleasing panel effects may be obtained with the latter method of treatment.



Note how easy it is to apply Gibraltar Board when lining walls, etc.

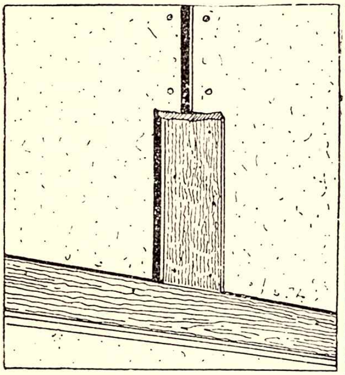
Apply it full length up and down the walls starting at one corner and working to openings.

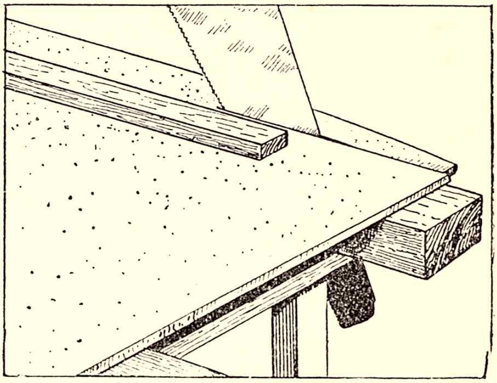
Hardboard Wallboard.

A SECOND type of wallboard, particularly suitable for kitchens and bathrooms, is known as "hardboard." There are various brands, and it is made in two thicknesses, 1-8th inch and 3-16th inch. Where it is being applied over an existing match-lined wall the thinner type is quite suitable, but where it is being used on an unlined room the thicker one is advisable. These hardboards are manufactured from wood pulp. They make a neat finished wall, and, as they can be lacquered or enamelled with perfect results, they are ideal for kitchens and bathrooms. They are being increasingly used in New Zealand, particularly in offices. They are fairly expensive, and, if unobtainable, can be substituted with "Gibraltar" board. They are available in many lengths in 3ft. and 4ft. widths. See that you get a really good quality one, not one that is merely compressed cardboard.

Pulp-board Wallboards.

WHERE you want merely to completely renovate an existing room which is already scrimmed and papered, ordinary pulp-board wallboards can be used. These have very definite limitations, but for bedrooms and living-rooms will give permanent finishes. They, too, are supplied in 3ft. and 4ft. widths. They can be nailed over the existing paper if desired, but, as a general rule, in old houses it is a good plan to remove paper and scrim and start from bedrock again. They can be nailed either horizontally or vertically, as desired, and will have to be covered with battens at the edges. This is not a disadvantage today, for there are many attractive types of narrow battens available which harmonise well.





For a time these pulp boards, which were all imported were off the New Zealand market but a locally made product is now available. Their treatment is quite simple and they will take any type of paint satisfactorily provided the maker's instructions as to sealers and primers are carefully followed. You have to remember that these are really only a form of cardboard, and that the surface is very porous, so that the correct treatment is essential for good results. Flat paint gives what is usually the best result, one like "Berger's "Matone" giving a very pleasing finish on pulp boards. The joins can be covered by battens. Some amateurs prefer to screw, rather than nail these, so that they can be easily removed when repainting is to be carried out.

Estimating the Wallboard Required.

THE quantity of board required if you are intending to work the boards vertically is ascertained by measuring the areas to be covered in square feet, then dividing by the number of square feet in a single board. For example, a room 9ft. wide, 12ft. long and 8ft. high. There are 72 square feet in each of the ends, and 96 square feet in each of the sides, or a total of 336 square feet in the room. The most convenient length of board will be 8ft., because it will fit between the floor and the ceiling without cutting. Taking a 4ft. wide board, the number of square feet in it is 8 x 4 equals 32, so that if you divided the 336 by 32 you would find you needed 10½ boards; in other words, you would have to have 11 sheets of board, size 8ft. x 4ft.

Supposing, on the other hand, that you intended to work the same room but to put your board horizontally. You would find that it would take two 4ft. boards to reach from the floor to the ceiling, so you would require four boards each 9ft. x 4ft., and four boards each 12ft. x 4ft. For ease of calculation, we have not taken the ceiling and have not allowed for the doors and windows that there will naturally be. The calculations, however, are relatively simple, *but the great thing to watch is to see that you order boards of the length which makes for the least cutting.* The boards can be easily enough cut with a chisel, but that wastes a good deal of time, and if your walls are of a size that permits the use of standard boards without cutting, much time will be saved.

Fastening The Boards To The Wall.

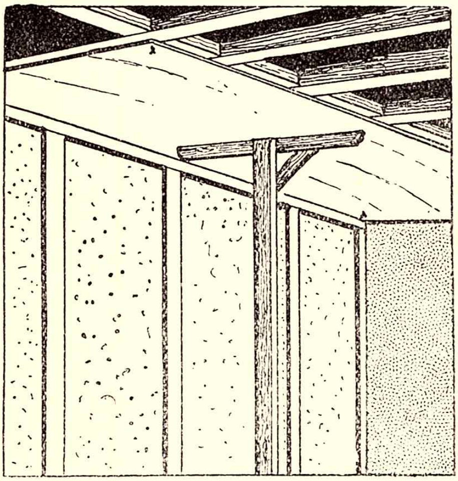
THERE is always a tendency with wallboard, particularly with the lighter types, for it to sag away from the wall if it is not very firmly nailed. It is essential,therefore, to see that the job is properly done in the first instance. The tendency to sag is greater when you are using 4ft. widths and placing them horizontally, but if the method recommended here is adopted you will have no difficulty. On unlined rooms you merely nail along the studs, and you must then have a stiff wallboard, either "hardboard" or "Gibraltar" board. In any case, whether using boards over studs or on an existing wall, use 1½in. flat-headed galvanised nails for the job, where the work is being covered by battens. However, where you are placing the boards horizontally along a wall, if you nail only at the top and bottom of a 4ft. wide board you will have a sag in the centre, with the board coming away from the wall. It is easy enough to avoid this. For "Gibraltar" board the makers recommend that you use 1¼in. Cadmium-plated, countersunk flathead nails, and that on the walls, at the edges of the sheets, these should be spaced 4-5ins. apart, and at centres about 9ins. apart. On ceilings the nails should be about 3in. apart at the edges and about 6in. apart at centres. The nails *should not be punched,* but driven only just flush below the surface of the board. The chipboard envelope of the "Gibraltar" board should not be broken.

It is advisable to have about 1-8th to ¼ inch between the boards, as these expand a little sometimes. Work from the top, smoothing the board down as you go. Watch the window openings and see that you cut the board exactly to fit. By the windows, so that the nails may not be seen, finish off with ¾in. round. Any timber merchant will give you this. It costs only a few shillings a hundred feet, and is useful for covering all odd edges round windows, doors, and where the walls meet the ceilings.

There are many different types of battens from the 3in. flat ones down to ¾in., finished round in front. Two-inch battens finished off semi-round in front look well, but provided the nails on your boards are kept well to the outside edges the ¾in. rounded battens can be used. They look particularly well in kitchens and bathrooms. The battens can be either nailed or screwed. The advantage of screwing them on is that when the room comes to be repainted they can be easily removed, the surface of the boards cleaned and painted, and the battens done separately. This is particularly valuable where the battens are finished off with a contrasting shade. It is difficult to do them evenly if they have to be done on the wall.

Wallboard On The Ceiling.

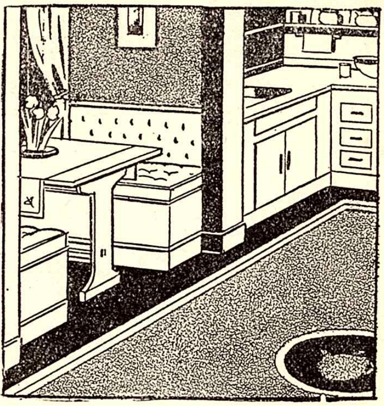
IT is a little difficult to nail wallboard to the ceiling without any assistance, but only because of the awkwardness of handling a wide and long sheet, and not because the board itself is heavy. If you make a T from a piece of batten and get someone to hold up one end of the wallboard while you nail the other end, you will have no trouble with the ceiling. If using fibre board, leave 1-8th to $\frac{1}{4}$ inch between the sheets, but with plaster board make a close join, particularly if you want to finish the ceiling without using battens. It is advisable to nail the board both ways, that is to say, to have your ceiling battens in squares so that there will be no sag in the ceiling. Nothing looks worse than a wallboard ceiling which is sagging in the centre. If the ceiling is finished off in 2ft. to 2ft. 6in. squares with narrow battens it will look very well, and you can be certain that it will give no trouble in the future. Therefore, if you are doing the ceiling of an unlined room, see that there are cross pieces between the joists to which you can nail your wallboard.



Working a ceiling is always difficult for an amateur. Here is a device, easily made from odd pieces of wood, which will allow you to hold the wallboard tightly to the ceiling. Make sure your board is in the correct position before commencing to nail.

Renovating An Old-Fashioned Kitchen.

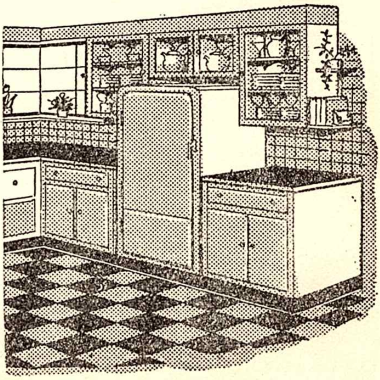
IF you've looked at your old match-lined kitchen with despair and compaired it with some of the new and modern kitchens in the houses of your friends, remember that for a very few pounds you can completely modernise your own kitchen. All that is needed is hardboard wallboard, plenty of ideas, a small amount of carpentering ability, and a few pounds. The best plan is to work out first of all exactly the number and size of the cupboards you need. If you are handy with tools you can make and fit them yourself, also renew benches, etc. Perhaps you may decide to build a service hatch from the kitchen to the dining-room, if that adjoins the kitchen, in which case you will be going through from one room to the other. But whatever you do, plan it all out on paper first, and study it to make sure that the way on which you finally decide will allow you to do your work, using the least possible number of steps.

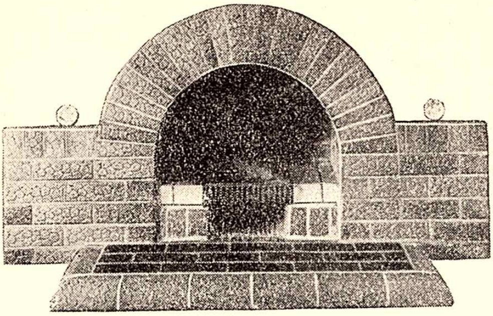


Having fitted your cupboards, you find that you have 200 square feet of wall left to cover. As this wall will be already covered with match-lining, you can buy a thinner and cheaper hardboard, 1-8th inch (if unobtainable you could use "Gibraltar" Board), and use it horizontally. As your cupboards will probably run to a fair height, you will find that a 4ft. sheet placed horizontally will probably reach your ceiling. It is an advantage if this is the case, as you then have no joins to cover. Moreover, as you can never have too many cupboards in a kitchen for empty preserving jars, etc., you will be wise to try and work your walls so that either a 3ft. or a 4ft. board takes the whole of the space between the top of the cupboards and the ceiling, and the small $\frac{3}{4}$-round strips that will cover the joins where the wall meets the ceiling.

Use A Modern Wall Finish.

WHATEVER you do, don't spoil the finish of a modernised kitchen for a few shillings worth of paint. Having gone so far, you should finish with one of the modern highly glossy surface finishes, such as "Dynamel." These are available in a wide variety of shades, and you can get beautiful contrasts of pink and grey, primrose and apple green, etc., such as will make your kitchen a pleasant and restful place in which to be. These finishes are all washable. They can be kept in perfect condition for years, so that the initial expense, though admittedly dearer than ordinary paints, is more than recouped by the longer life. These modern finishes have a greater coverage per gallon than ordinary paint. The merchant from





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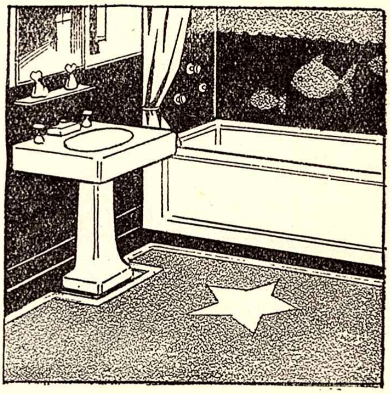
whom you purchase it will be able to tell you just how much you need.

On hardboard you will need one undercoat and one finishing coat with these materials. You must, of course, use the special undercoat the makers recommend. On no account use ordinary paint as the base for a coat of "Dynamel." It is true that these finishes can be applied over the top of old and worn paint, particularly when it is well sandpapered, but when you are working on new board you should use only the materials specifically recommended if you want a first-class job. They are not difficult to apply. You "flow" them on—not "brush" them in. If you doubt your ability, try them out on a spare piece of board before you get to work on the wall.

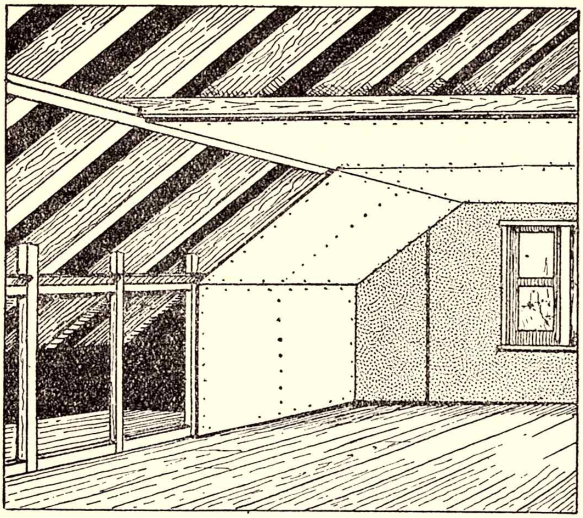
Modernising Your Bathroom.

WHAT applies to your kitchen applies also to your bathroom. Doubtless when you've looked at magazines in which were pictured perfect modern bathrooms with their plain walls picked out in gay colours, you have longed to change that rather drab match-lined bathroom of your own. Do so. You don't need to spend a great deal of money, for hardboard and "Dulux" will do the job there just as well as in your kitchen. Even if you have the old-fashioned rounded bath you can, with care and a little ingenuity, build it in so that it will look really modern, for the thinner grade of wallboard will bend quite easily round a framework. The average bathroom is about 8ft. x 6ft. 6in., and from 9ft. 6in. to 10ft. high. Such a bathroom finished off with 1-8in. hardboard and "Dulux" can be done for from £6 to £7. It is then a permanent job. Hardboard treated in this way is excellent for shower rooms or recesses, too—in fact, there is no limit to what you can do with it in the way of modernising kitchens and bathrooms.



Lining Whares, Seaside Baches and Garages.

THE lining of seaside baches and similar places with the materials employed in houses is usually too costly, but to-day many materials are available which will allow you to have the comfort of a city home in a country whare at very little cost. Probably the best known in New Zealand is "Sisalkraft," a novel and inexpensive material which is ideal for this purpose, and for lining garages, putting under roofs, behind wallpaper instead of scrim, etc. In essence, it consists of a specially-made tough "kraft" paper, reinforced with threads of sisal, and with a thin waterproof core of a bituminous substance. It is therefore both wind and waterproof, and whares that are lined with it are as cosy and comfortable as an ordinary house. It is available in many grades from wallboard downwards, can be made to fit snugly over studs and rafters, and can be painted, kalsomined, or given any finish desired.



To turn a space under the roof into a useful extra room usually requires only a little thoughtful planning. See that you buy the correct width of wallboard to fit the width between the studs. You can see the detailed method from the drawing.

It is an easy material for amateurs to handle, and is therefore ideal for use in baches and whares.

An Amateur Can Do the Work.

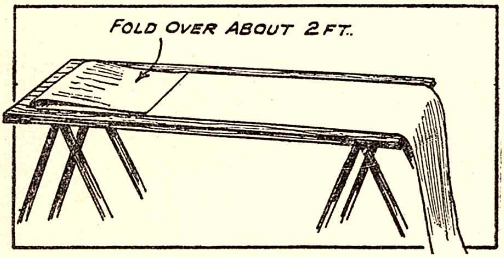
PROVIDED the instructions which are given here are carefully followed, there is no reason at all why any amateur who has used tools to some extent cannot make a perfect job with wallboards which are easy to use. The first thing to do is to determine accurately the quantity of wallboard required, and the most suitable length. That will depend on whether you want to work vertically or horizontally on the walls. For bedrooms, boards worked horizontally, with narrow battens with rounded corners covering the joins, give a very pleasant result. These battens can be had in either 1in. or 2in. widths, and can be painted the same colour as the room, or finished in a contrasting colour if desired.

* * *

How To Paper Your Rooms

A GREAT many people would like to try their hands at papering, but remembering the old song about father's predicament when he "tried to paper the parlour," they imagine it is really difficult, and put up for years with faded papers which are an eyesore. Frequently, particularly in the country, it will not pay to have a man come out specially for the job, but when you know that for a few shillings you can make the room look like new you will go ahead. Papering is not difficult. There are a number of things to watch, but provided the instructions given here are followed carefully there will be no difficulty. British wallpapers are all in standard widths of 21in., and standard lengths of 12 yards, so that the calculation as to the number of rolls required is not difficult.

The tools required are few, and consist of a large pair of scissors, a paste brush, a pair of steps, a good-sized table, and a good firm brush for smoothing down with. The paste brush should be a good wide one, preferably 6in., and if you buy it new you should let it soak overnight before using it. The smoothing brush should have reasonably smooth hairs—the ones you buy at the paint shop cost about half-a-crown—but an old clothes brush will do. You can buy cold-water paste from any merchant selling wallpaper, and a 6d. or 1/- packet goes a long way. If you want to make your own paste, however, you can do it by putting some flour in a bucket and adding cold water, stirring vigorously all the time until it becomes a thick smooth paste. Beat it for a time with a stout wooden stick, and then add boiling water—it must


FOLD OVER ABOUT 2 FT.

This illustrates the method of folding the paper. On the next page, the later stage, with paper folded, is shown.

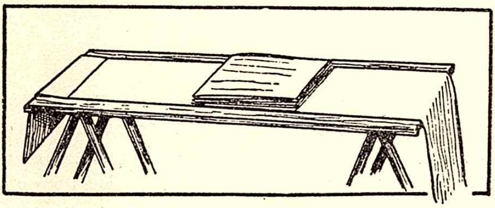
be absolutely boiling—until you have a thin paste. Once it is cool it is ready for use.

Should you remove the paper underneath? Not unless it is in bad condition and has loosened the scrim to which it is attached. In that event you must remove it, and re-tack the scrim so that you have a firm surface to which the paper will adhere.

How To Measure Your Room For Paper.

HERE is the easiest and most exact way of measuring your room to find out the number of rolls of paper you will need. Measure the wall space to be covered *round the room* in inches, divide this by 21, multiply by the height of the wall to be covered to the nearest foot (allowing 6in. for wastage) and divide by 36. You will then have the number of rolls you will need for covering the wall space, and will only require to work out what you need for the ceiling.

To take an actual example, we will assume your room is 20ft. long, 12ft. wide and 9ft. 6in. high, and is to be wholly covered with wallpaper, with the exception of the doors and windows, whose total width amounts to 12 feet. The horizontal measurement of the wall to be covered (in inches) will be: (240 x 2) plus (144 x 2) minus 144 equals 624 inches. Dividing this by 21, we get 29 and a fraction, which means we will need 30 vertical strips of paper. Now the height of the room is 10ft. (9ft. 6in. plus 6in. for wastage), so that 30 x 10, or 300ft. of paper, will be required, and since there are 36ft. in a roll, the number of rolls will be 300 divided by 36, or 8 1-3, so that you would purchase 9 rolls.



Here is the paper, pasted and folded ready to go on the walls. Take careful note of the instructions given in these pages.

Measuring, Cutting and Pasting The Paper.

MEASURE off about 6in. more paper than you will need for covering the wall, then apply the paste. It is most important to apply the paste in such a way that it gets only on the back of the paper, as any that gets on the front makes an unsightly mark. For that reason let your paper go about $\frac{1}{4}$in. over the edge of the table while you paste. Then to do the other edge pull it over the edge of the table and repeat. Fold pasted section to pasted section, until the whole length has been completed and is ready to go on the wall.

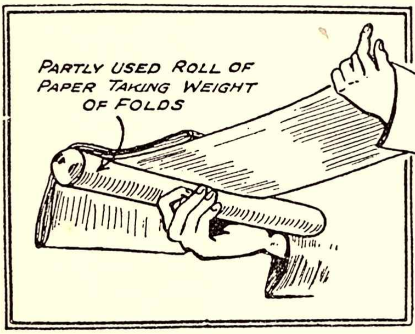
Start in the darkest corner of the room. Bring the top of the paper into contact with the top of the wall, leaving a couple of inches spare for final trimming. The weight of the pasted paper will now cause it to fall vertically down the wall. Work gradually down the sheet, taking great care to see that you have it square, and smooth off with your smoothing brush. Remember that the first sheet is all-important. If it does not appear quite right when you have finished it, gently move it away from the wall again (it will come quite easily), and do the job again. Once you have got the first sheet absolutely square you will find the job moves ahead easily. The next thing is to trim the ends. Run the back of the scissors along the top of the wall so that a definite mark is made, then cut along this, doing the same at the bottom.

Matching Your Sheets, And Odd Hints.

IF you are using a patterned wallpaper remember, before you cut your next length, to see that the pattern will match as cut, or you may waste an entire length. Of course, if your paper is merely a plain one there will be no difficulty. When you come to fireplaces, windows, etc., use the back of the scissors to mark clearly where the paper will have to go, and then trim. You will find no difficulty in trimming the paper to go round the most intricate places.

Papering A Ceiling.

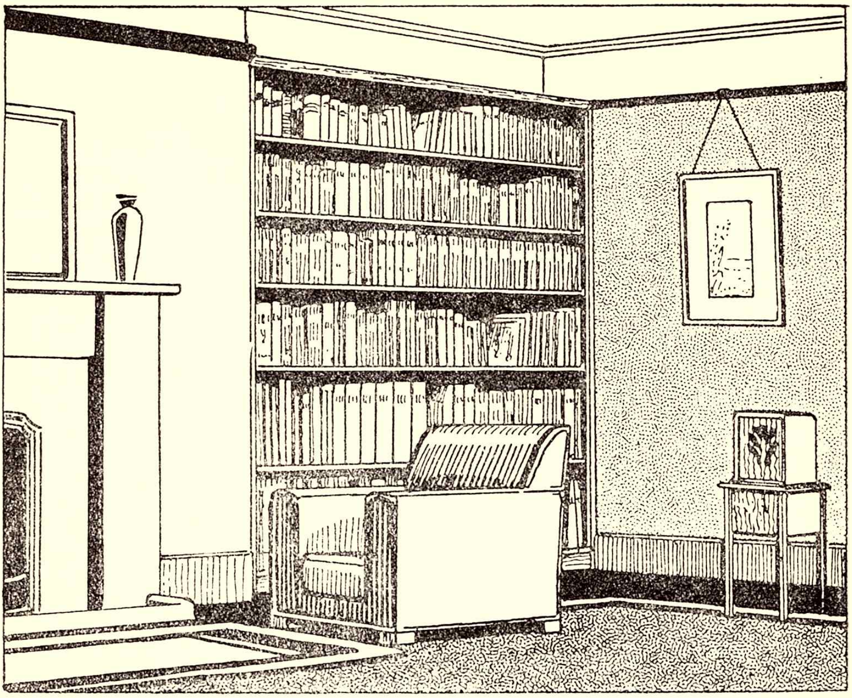
THIS is the most difficult part of any room, and for it you must have a couple of pairs of painter's steps between which you can erect a small scaffold from which you can work with ease. It is no use trying to makeshift with something that allows you to reach the ceiling only with difficulty; you must have ease of working or you will find it an almost impossible task.


PARTLY USED ROLL OF PAPER TAKING WEIGHT OF FOLDS

This shows the easiest method of papering a ceiling. Follow it and you will have no difficulty in doing the job.

See that the scrim is tight. If at all loose, tack it tight. You will find it a big help to lay a line along the ceiling at the spot where your paper should go. Get a piece of string and measure 21in. (the width of your paper) from the edge, putting the string in place with a tack. Then go to the other end of the room and do the same thing, and you will have a line stretched along where your paper should go, and acting as a guide in your work. A better way still is to chalk the line with coloured chalk, lift it off the surface and snap it back, when it will leave a coloured line on the ceiling where the paper is to go.

Let the pasted paper hang on to your left forearm, then slip your right hand under the paper and offer it to the ceiling. When you get it in the correct position brush it firmly on to the ceiling, as you walk slowly down the scaffolding board. (That is one reason why you must have a good scaffolding board.) Once you have become fairly expert in working paper on a ceiling you should be able to use a clean house broom to help make it adhere firmly to the ceiling by running the broom slowly but firmly along the surface of the paper.



Built-In Furniture For Comfort

ALTHOUGH built-in furniture of various types has been known for centuries, it is only during very recent years that the full advantages of built-in furniture have been really appreciated. In New Zealand, where our houses are almost invariably built of wood, and where building costs are very high indeed, built-in furniture offers ways and means of economizing in space, and completely modernizing older houses. In almost every house there are odd spaces here and there which lend themselves to the building-in of wardrobes, cupboards (and has any housewife ever announced that she has sufficient cupboards in her home?) sideboards, etc. None of these jobs present difficulties to the amateur, provided he has a definite idea of what he wants, and some information as to how to go about the work.

One of the great advantages of built-in furniture is that it exactly fills the spaces intended for it. Take, for instance, a dressing-table. If you build it in, no space is wasted between it and the wall or window —indeed, in our homes it is frequently possible to let it into the wall for three inches, and thus secure additional space. This means that even with furniture of greater than average size, more of your room is left free, and, with smaller-sized rooms, you have the appearance of spaciousness. A second advantage is that, if the built-in fitments are made solid from the floor up, there is no sweeping and cleaning to be done underneath, and you are saved the heavy lifting of the furniture backwards and forwards. But perhaps the greatest advantage of all is the saving in cost. A built-in wardrobe running from the floor to the ceiling is utilizing so much of the walls of the room, that you are saved the cost of materials to a large degree.

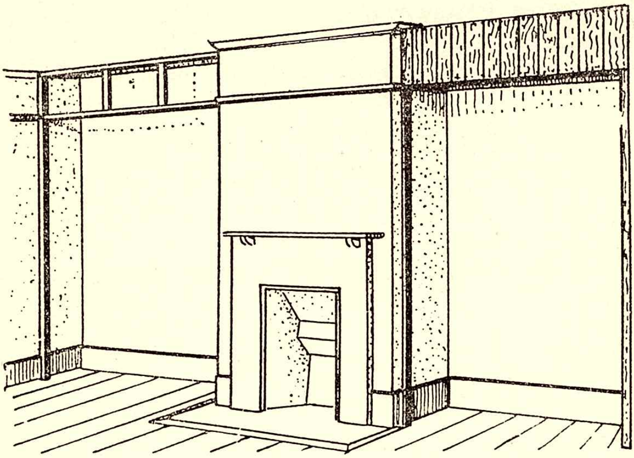
Points You Must Consider

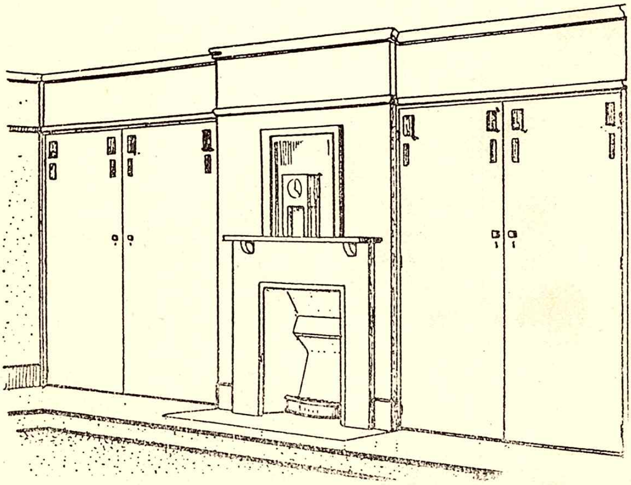
IF you wish to modernize your home with built-in furniture and equipment, you want to do one room at a time and make a thorough job of it, working out on paper beforehand the items you intend to build, and seeing exactly how they will fit in with the general scheme in the room. You will be particularly popular if you choose the kitchen first of all, because that is the workshop of the house, and a kitchen planned for convenience of working makes all the difference to the housewife. First and foremost is the arrangement of the benches and washing-up place in relation to the stove and the cupboards in which groceries, etc., are kept. Half the work of a kitchen can be saved by proper planning, and the delivery of meals to the dining-room, where that is through the wall from the kitchen, can be made easy by a service hatch of one type or another.

In the bathroom, the bath can be built-in with a modern hand-shower, and narrow cabinets let into the wall for shaving gear and medicines. In the dining-room you may be able to combine a service hatch from the kitchen, with a side-board, in which the china can be kept, so that when it is washed it is merely replaced from the kitchen side. In the bedrooms various ideas may suggest themselves, such as built-in dressing tables, wardrobes and shoe cupboards. There are few homes, indeed, which have been so well-planned at the outset that one or other item will not prove an advantage, and so, in these few pages, we are giving some information about the better planning of the interior of the home. When you are replanning, and improving the equipment of your home, you will naturally consider, if means are available, various amenities which are available today to lessen housework and lighten the more disagreeable tasks. There is a wide range of electrical gear now obtainable with which housework can be reduced to the barest minimum; the state of your finances at the moment will determine how much or how little you can afford. One of the advantages of doing these home carpentry jobs on which we are giving you information, is that it leaves you with more spare cash for some of the little luxuries that make modern life worth while.

Making Wardrobes With Drawers

IN a general way, the plan below should give you an idea for making any type of wardrobe fitting. One of the handiest it is possible to have, where the space is available, is a wardrobe that is fitted inside with a series of drawers of various sizes, suitable for shirts, socks, handkerchiefs, etc., in the case of a man, and for underwear, etc., in the case of women. At the bottom of these wardrobes you can have one or two shelves for shoes.





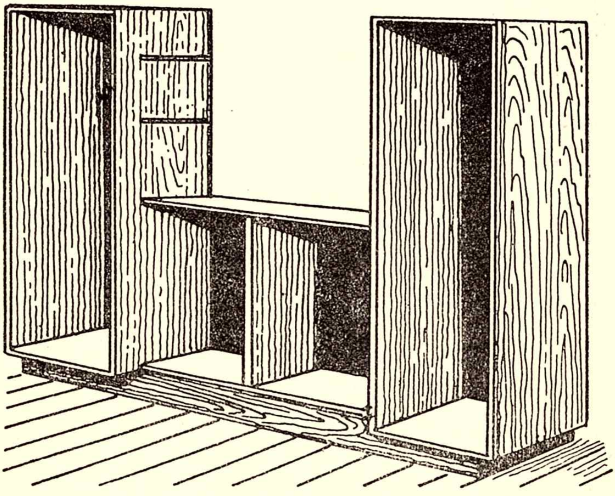
The completed unit. Wardrobes, bookcases, etc., in position, making a very useful and complete outfit.

The diagram shows how these wardrobes can be built in a room where there is a chimney projection, to take up the space that would otherwise be wasted. Plain modern-looking doors, with the new coloured and chromium handles, add to the effect.

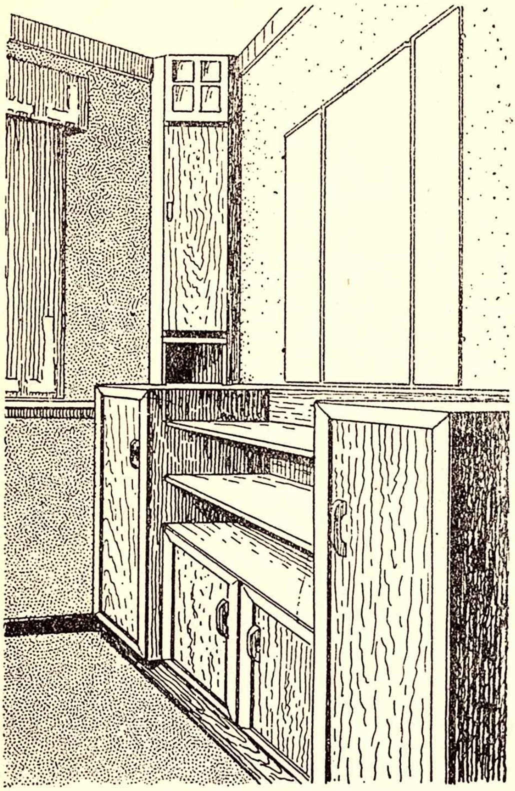
Inside the wardrobe you have one portion left clear for the hanging of frocks, and for men's coats, while in the other portion are placed the drawers. There is no need to make these drawers elaborately, as long as you make them strong. Buy the timber already cut to the sizes you want, and planed, and see that your sawing is absolutely at right-angles. The diagram shows you how to fit the front, and the drawer will then run along runners, which you will fit into the framing. You will find it an advantage to glue the sides and back of the drawers, as well as nail them, and also to glue the front piece. There is no need to have them fitting to the fraction of an inch, as long as they run easily.

A Built-In Dining-Room Sideboard

THERE are a number of possibilities in the way of built-in furniture for the dining-room, of which the most useful is undoubtedly a built-in sideboard. If it so happens that your kitchen is immediately next to your dining-room, it should be possible to have the sideboard fitted to the wall next to the kitchen, in such a way that doors enter it from the kitchen and also from the dining-room. The sideboard we describe here was built-in recently in a Wellington home on a wall that was not against the kitchen, so we are giving it just as it was. We would suggest that, where it was desired to build it in as a between kitchen and dining-room fitting, you would cut through the wall, fit it in to take the full depth of the wall, then have doors at the rear opening into the kitchen. We think also that, in those circumstances, it would be wise to incorporate the two shelves



in an additional cabinet, that is to say, have doors in front of them, and then, where the mirror is shown here, have doors opening into the kitchen, and a shelf level with the bottom of the mirrors, on to which the food would be served. On the kitchen side you would have a cupboard with shelves on which much of the china would be placed, leaving a reasonably-sized opening through which the food would be served. As with the fittings mentioned in the case of the bedroom, the materials you would use would depend upon the present arrangement of your dining-room. Probably oiled rimu is as good a finish as you could have for a fitting like this, but if you were prepared to go to the expense, and it fitted in with your existing scheme, oak would look even better. Plywoods are easy to work, and reasonably thick ones would make a satisfactory job.



Size And Method Of Making

THE sideboard we are dealing with is 6ft. 2in. long overall, can be of any height to fit in with your room, and is made in three sections, as shown in the diagrams. The two side cupboards can be 4ft. high, the centre ones 2ft., and the depth 19in. The two side cupboards should come out over the base two inches at the front and the sides, as this enhances the appearance of the fitting.

The constructional details are very simple, and the diagrams are almost self-explanatory. Build your base, first of all, 5ft. 10in. by 1ft. 5in. It can be made of 3 x 1 dressed rimu. Then make the two large cupboards, taking care to cut your boards very carefully and correctly, so that they will be absolutely square. Screw and glue the bottom boards, and glue the top piece. Decide what shelves you want before you put it together, and allow the necessary fittings inside to carry the shelves. Then build on your two centre cupboards, which is a very simple matter, add your shelves, and you will have only the doors to complete. These can either be plain, of plywood about ½in. thick, or of oak or rimu, made either of solid timber or of 3 x 1 batten top and bottom, with thin plywood. Finish the fitting with modern coloured or chromium handles, and you will have a piece of furniture of which you can be justly proud.

COMPACT FITTED WARDROBES

NINE out of ten of the wardrobes which are purchased turn out to be too small or too inconvenient in use, with the result that most people long for the compact, carefully-arranged wardrobes which they see pictured from time to time in illustrated papers from overseas. If you try to buy such a wardrobe in New Zealand its price is prohibitive, because the demand is small. Yet there is no reason why you should not make it yourself, fit it, and have it looking absolutely professional. A wardrobe, when all is said and done, is simply a very large box, included in which are certain fittings, and, while the work of making it accurately so that it looks pleasing to the eye may take a good deal of time, there is nothing to prevent you doing the job very effectively. If you can build your wardrobe into a recess, so much the better; you can then probably use some of the existing house walls, saving in the cost of materials, and allowing you to do the fitting more easily.

The ideas which you can get in making a fitted wardrobe are legion. We are showing only two, but they will, we hope, give you sufficient information for you to adapt them to your needs. The materials you will use will depend on the room, and whether or not the wardrobe is to be fitted in. If you are fitting it into existing walls, and you have a plain coloured bedroom, say, flat painted, then your best material will be hardboard, which can be painted. If, on the other hand, the wardrobe is to be a separate unit, then you will want to make it of rimu, or oak, or of plywood, the last-named in the thicker varieties, being particularly useful for doors, which can be cut from the one piece of timber and which will not warp.

The men's wardrobe we show is about six feet high and about five feet wide, and in making it you would, first of all, make the outside "box," and then add the various fittings. Whether you would screw and glue all the joints, or merely nail them, would depend on the type of job you wanted; screwing and glueing are worth while if you want the best. Select good, well-dried timber that will not warp—¾-inch. planed and dressed rimu would do well, and be sure that all your saw cuts are made at perfect right-angles, and that your measurements are accurate. If you do that, the fitting together is easy.

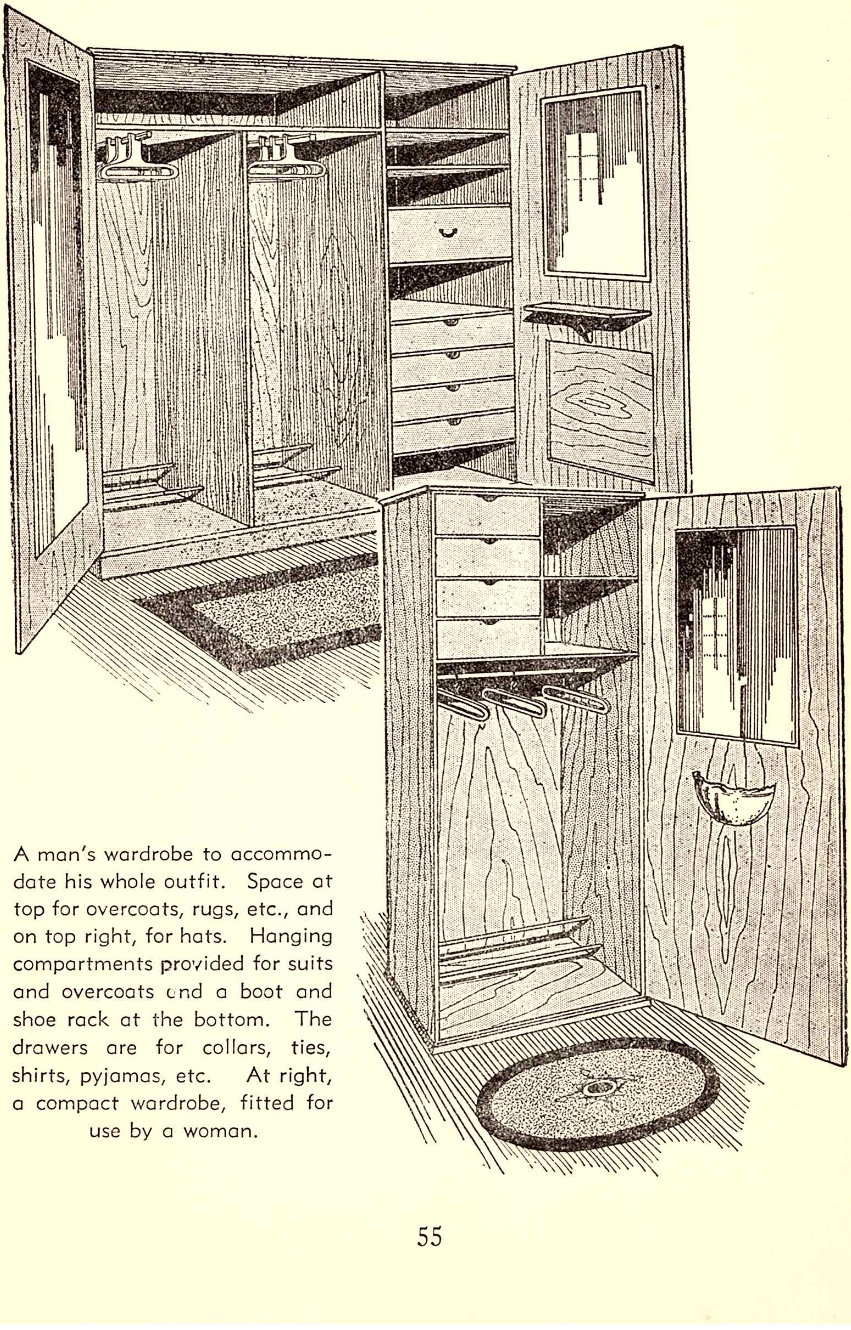
If you are making a wardrobe exactly as shown, you will divide your "box" when completed into the three sections, then make your drawers, which again are merely boxes without lids, fitted with handles, seeing that they run freely. The space at the top left is for hats, rugs, etc., and the hanging compartments for suits and overcoats, while the rails at the bottom are for shoes. In the drawers all your shirts, collars, etc., can be kept. Don't have very deep drawers. They are a nuisance, and it is better to have a larger number of small drawers in which the things you want most do not become hidden under other things.

We have purposely refrained from giving exact sizes here, because a wardrobe is one of those personal things whose size must depend on the quantity of clothes you have, the room in which it is to go, and a number of other factors. All essential details are included in the diagrams. The sizes you can easily adjust, according to your own requirements. In the woman's wardrobe, note the spaces for hats and shoes. These are very important. Whether you want the mirrors and fittings will depend on yourself, but when finishing off your doors, see that you obtain the modern chromium-plated and coloured handles. They add that final touch that makes the difference.

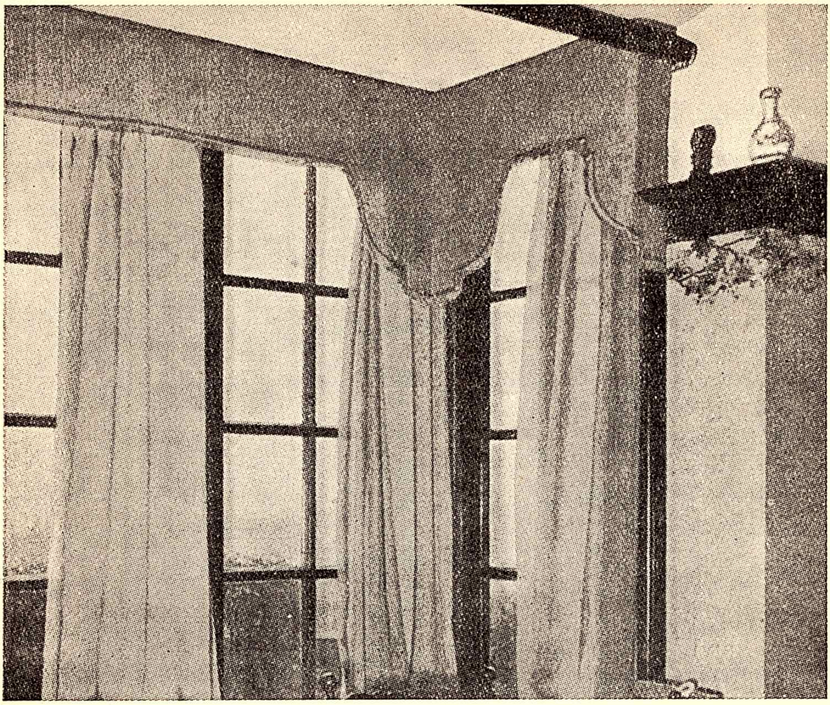
Building-In A Bookcase

IN a wooden house the easiest article of furniture to build-in to a recess is a bookcase, because 9in. x 1in. shelving is all that is needed. Take, for instance, the bookcase shown at top of page 51. It is 4ft. wide and 6ft. 6in. in height. The materials you require are planed and dressed 9 x 1 rimu shelving, and a few screws. In ordering the shelving, you would specify it as follows:—Two pieces 6ft. 6in., and seven pieces of 4ft., so that it would take 41 running feet of timber that should cost you no more than 15/-. Make your measurements carefully, cutting your shelves (if you have not got timber actually cut to measurement), and trying them against the end-pieces to see that they fit exactly into the required space. Then screw them in with 2in. screws from the outside of each of the ends. The screws will not show when the bookcase is fitted, for the heads will be against the wall in each case. Finally, nail or screw the bookcase itself into position. A couple of nails in each end will be sufficient if it has been properly made of seasoned timber.

The staining you will require will depend on the staining of the wood in your room. Mix a little Condy's crystals in water, and try out the effect till you get a stain that is just the right shade. Then, for a finish, after the Condy's has completely dried, paint over with knotting, which will give you a lovely transparent gloss that shows up all the grain in the wood.



A man's wardrobe to accommodate his whole outfit. Space at top for overcoats, rugs, etc., and on top right, for hats. Hanging compartments provided for suits and overcoats and a boot and shoe rack at the bottom. The drawers are for collars, ties, shirts, pyjamas, etc. At right, a compact wardrobe, fitted for use by a woman.



CURTAINS FOR THE HOME

THERE has never been a wider range of materials (and designs) available for selection for curtains, than there is today, for, in addition to the older-fashioned lace curtain material, there are chintzes, silks, linens, and cottage weaves available in a bewildering variety of patterns, which tend to make final choice difficult. We propose here to give but a few ideas that will assist you in your selection, dealing with general principles only. There are a few simple rules which, if kept in mind, will allow you to achieve a delightful effect, no matter what the size of your room, or what the nature of the materials you have purchased, and it is neglect of one or other of these that is responsible for the unbalanced appearance of many of our rooms.

In the first place, a plain and simply-furnished room requires plain and simple curtains. It is a great mistake to combine the simple type of furniture with which most of our homes are furnished today, with gorgeous window draperies. In the second place, you must remember that, in a very large room with plain walls, plain unpatterned curtains tend to make the room look bare. On the other hand, plain curtains in a small room make it seem larger, and are an advantage. Fabrics with small repeating patterns are for small rooms, and ones with large bold patterns are for big rooms. Look at the furnishings in some of our well-equipped hotels, and you will see the truth of what we have said. When the choice of materials is right, they may pass almost unnoticed in a room because everything harmonizes, but when there is a clash of materials or a clash between the wallpaper and the curtains, the whole room seems to be out of joint.

Curtain materials on which there are wide designs or big floral patterns are quite unsuitable to the average New Zealand room, and the type of material that gives us the best effects is the one with a small pattern, or with a "shot" effect. Bright cretonnes with small gay patterns are specially suitable for rooms in which dark oak furniture is found. In our bungalow-type of houses also, most curtains look more finished where there is a valance or pelmet running across the top.

Coloured lace curtains are now very popular, but care must be taken that the shades you select harmonize with the colouring of your room walls. Thus, if you have sunshine-yellow walls, you can have yellow net curtains, or with pink walls you can have pink net curtains.

In a room with plain walls and ceilings, you can afford to have patterned curtains and patterned coverings for the chairs—in fact, the room will look almost too plain if you have no pattern at all. If, on the other hand, you have a patterned wallpaper and patterned carpet, it may pay you to have plain curtains, or ones of the cottage weave type. You can only decide what will look best under your circumstances by studying your room and selecting curtains that harmonize generally with your colour scheme.

Hanging Your Curtains

THE old-fashioned way of hanging curtains was to make a loop top, poke a piece of brass tubing or rounded wood through this, and attach it in some way or other to the wall. That system is thoroughly out-of-date today, when many different systems of curtain hanging are available. For the average room, where the constant moving backwards and forwards of the curtains is unnecessary, the cheapest and most satisfactory way of hanging curtains is with expanding rustless wire, which can be obtained very cheaply from the chain stores, or from hardware shops. By slightly stretching this material, the curtains can be made to hang firmly and correctly.

In the case of windows where it is desirable to be able to pull the curtains backwards and forwards, as in sleeping porches, the material to use is the specially-constructed brass railing on which the curtains run on wheels, which are attached to the curtains themselves. This railing, which is everlasting, as are the fittings, is expensive in the first instance, costing about 1/3 a running foot, but once it is erected into place (and this is very easily done with the special fittings provided), it is a permanency. It is by far and away the most satisfactory material to use wherever curtains have to be moved, and is now largely used in offices where shelves and bookcases are covered with curtains that run on these brass rails.

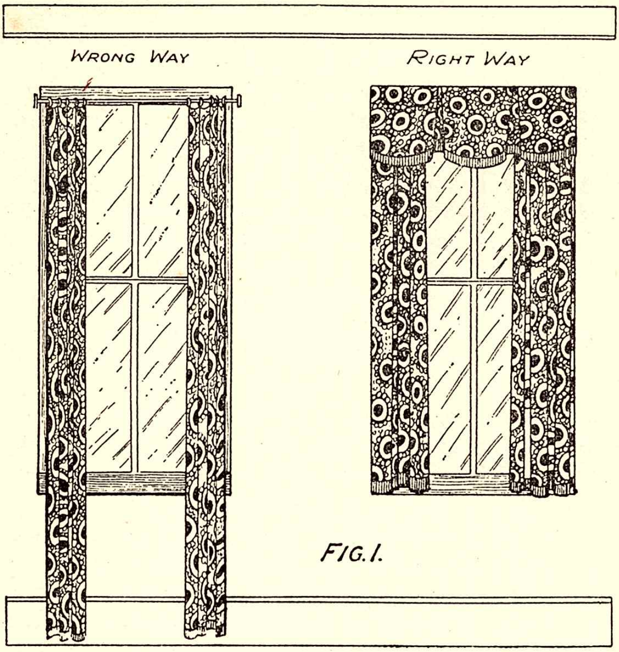


FIG. 1.

The right and the wrong treatment of windows.

Making and Fitting Pelmets.

WINDOWS can frequently be improved in appearance by the use of pelmets, as shown in the illustration, and these can be easily made, provided a little care is taken. It is advisable to make patterns of the pelmet in paper before cutting out your material, so that you can be certain, before wasting any material, that you have exactly what you want. An old roll of wallpaper left over from some previous job is ideal for the purpose, for, on this you can draw your design and cut the whole thing out without any joining up of paper. When you draw the pattern it is only necessary to draw one half of it, then, by folding the paper in the centre and cutting out the design, both halves will be exactly the same. The width of the windows may vary a little, but if you measure them accurately you can allow for that without difficulty. and, provided you make your original paper cut-out the exact size to fit the windows, your pelmet will be perfect.

A pelmet consists of three thicknesses of material. The material which shows in the room. the material which shows outside the window. and a stiffening material in the centre. for which unbleached calico is as good as anything. When you are ready to make the pelmet "bagging," as it is called, you place the two outside pieces of material *face to face* and the calico on top of them (all three having been carefully cut out from the pattern), and the whole is then machined about half-inch from the edge all round, with the exception of a space on the upper edge of about 12 to 18 inches. In other words, the pelmet is put together exactly the same way as a sack is stitched up. It is then necessary to make small slits at all the corners and curves so that the pelmet edges will lie as flat as possible when finished. These should be cut close up to the stitching, but care must be taken that they do not cut into the stitching. Then turn the bag completely inside-out and stitch up the top opening by hand, and your pelmet is ready for ironing and fitting. The pelmet is usually attached to a small board which can be easily erected.

ELECTRICITY FOR THE HOME

IN New Zealand we are fortunate in having cheap supplies of electricity readily available throughout practically the whole of the country, with the result that there are more labour-saving aids installed in our homes than in almost any other country, with the exception of America. Yet it is true to say that, as yet, we have but touched the fringes of that greater comfort which electricity offers to us all, and that, as the cost of electrical apparatus is gradually reduced through its increasing use, more and more of the drudgery of housework will be done by electrical power. People who have been living for years in the same house, where there has been little use of electricity other than for light, have little conception of the savings in time and energy offered by the use of electrical gear in the home, and to plan gradually towards the all-electric home is a sensible method of making use of an increasing amount of leisure year by year. Because of the widespread interest in modern electrical appliances today, we are dealing very briefly with them; their great advantage, of course, is that they offer just as great conveniences to the country housewife as to the woman in the city. While, in this section, we are giving some information regarding the repairing of damaged electrical appliances, we cannot too strongly urge upon readers the advisability, in all cases of major trouble, of consulting a qualified electrician. It is illegal in New Zealand to interfere with the wiring of your house in any way, and, as it is also highly dangerous, there should be no interference with it. The one exception in the cost of country people is the replacement of burnt-out fuses in the switchboard.

The Modern Home

THE all-electric house is a common feature today. Such a house has an electrical hot-water system, giving hot water at all taps all the time, and frequently, instead of having the old-fashioned type of wash-house, it has a small annex into which is built an electric washing machine that does the arduous work of the wash without the housewife having to do any hard work herself. Fitted into the rooms will be permanent electric fires that will, noiselessly and without making quantities of soot, warm the house day by day at a minimum of cost. Cooking will be done on a modern electric range, the food may be kept in an electric refrigerator, and, if it can be afforded, there may even be an electrical dish-washing machine. Electric irons and toasters, electric vacuum cleaners, mixing bowls and other items of equipment, are all available to lighten the work, and the cost of running all these electrical appliances is so small, that the monthly bill will not cause any worry.

But, you may say, your home has none of these things, and they seem costly and unobtainable. Well, then, if you wish gradually to improve the amenities in your home, our advice is to save and buy some of these things one by one, or to utilize the convenient easy-payment methods offered by most firms dealing in them. It is for you to decide in what order you will obtain them, and whether you would prefer, in the first instance, to change over to electric cooking, or to install a thoroughly modern hot-water system. But, whatever you do, begin to *"think electrically,"* for electricity is the modern servant of man, and with it you can lighten your work immeasurably.

Repairing Electrical Apparatus

IN most instances the things that go wrong with vacuum cleaners, irons, toasters and the like, are obvious, and can be easily remedied. If they are obscure, then you will be wise to take the article to an electrical expert, for you may easily do irreparable damage if you attempt to do jobs that you do not fully understand. Nine times out of ten, what happens when your iron goes off, or your vacuum cleaner won't work, is that the flex wire has fused near the point where it is attached. To remedy this is easy. Simply undo the wire, cut off an inch or two (you can easily tell how far back you need go by the burnt-out appearance of the insulation), then reconnect the two wires to the holder. Be sure and replace the wires exactly as they came out. Sometimes there is a third wire—an earth—which is attached to a screw at the rear of the holder. If so, you must see that it is attached in its correct position, or it will not be fulfilling its proper function.

With electric irons, toasters and radiators, the heating elements may fail. If you suspect the element, always make certain first of all that the real trouble is not that your flex has fused. Once certain of that, suspect the element. In the case of a toaster, where the element wire is wound round and round a core of mica, you can frequently see the point at which it has burnt out, and a temporary repair can be effected by joining the two ends of the element again. This will not last very long, but should allow you to carry on sufficiently long to purchase the necessary new element or wire with which to effect a proper repair.

With most of the modern electric irons there are standard heating elements which can be replaced without much difficulty; in the case of some cheap irons, the repairs cannot so easily be effected. Much the same is true of radiators, but in the more expensive types the replacement of the elements is difficult, and it is better to leave the job to be done by an expert.

Repairs To Electric Lights

WHEN a light goes out, the first thing to suspect is that the element in it has broken or worn-out, but there are several other possibilities. A fault may have developed in the flex between the ceiling and the lamp, the fuse may have blown on the switchboard, or the switch in the room may be defective. *Whatever else you do, never attempt to investigate, with the current in the house still turned on.* Here is a general guide as to what you may expect the trouble to be:—

Fault.	*What May Be The Cause.*
One lamp not working	1. Lamp filament burnt-out. 2. Switchboard fuse "blown." 3. Defective switch. 4. Broken flex.
Several lamps not working ..	1. Fuse blown. 2. Short-circuit.
All lamps fail	1. Power failure in district. 2. Main fuse blown.
Fuse continually "blows" when replaced	1. "Short," due to foreign object. 2. "Short" through damp.
Unsteady light	1. Loose connexion. 2. Broken flex.
"Live Points"	1. Insulation broken down. *Beware!*

If at any time, in handling any piece of electrical apparatus, such as a vacuum cleaner, radiator, etc., you feel a shock, do not attempt to use it until you have had an electrical expert go carefully over it. It is a sure sign that there is a partial "short," that the insulation has broken down in some way, and that the current, instead of passing on to the proper point, is going to earth in the body of the person handling it. Take no risks. There have been several fatalities in New Zealand through neglect of this precaution.

Repairing A Fuse

YOU have probably seen the fuses on your switchboard. If you are in the country and a fuse goes, you probably want to make the repair yourself. Switch-off the electrical power at the main switchboard and remove the fuse. You will find that the tiny wire has burnt out. Replacing it is easy. You merely remove the screws that cover a small brass plate and two small holes will be exposed, through which the wire is placed. There are two different thicknesses of wire, one for lighting fuses and the other, a slightly heavier one, for the power fuses. Be sure you use the correct gauge.

Care Of Electrical Appliances

MODERN electrical appliances are manufactured to give the maximum service with as little attention as possible. Parts of vacuum cleaners and washing machines which require oiling or greasing are frequently so packed with grease, that no attention is needed for at least two years. We strongly advise you to take particular notice of the instructions issued with any apparatus you purchase, and see that that these are carried out to the letter. In this way you will extend the life of the appliance, and ensure its giving you the greatest satisfaction. The great majority of troubles with electrical appliances today can be directly traced to neglect of the maker's instructions.

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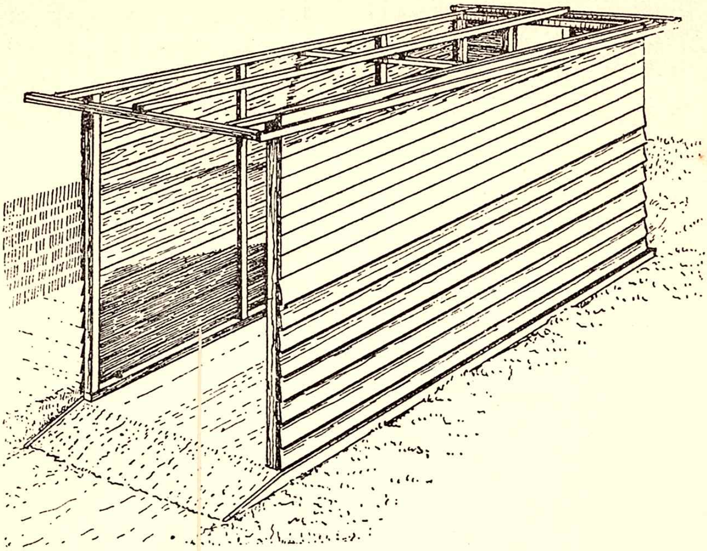


Building Your Own Garage

IN these days of high building costs, the erection of a garage is a definite burden, particularly to those of limited means who purchase a second-hand car, and who want to have their motoring at the lowest possible cost. Building a garage is not difficult if your land is flat, but on a hillside where you would need a reinforced concrete base is a little more difficult. Frequently, though, you can arrange to have the concrete base made up to ground level, including the floor, and then build on to it. The size of your garage will necessarily depend on the size of your car, and in building it you should remember that while a garage certainly adds something to the value of your property, the least expense you need go to (coupled, of course, with the need for having a decent-looking structure) is the best for yourself in the long run. Many elaborate garages are sheer luxuries, quite all right if you can really afford them, but quite unnecessary if you can't. We propose to give two convenient-sized garages here, which can be easily built by any amateur. There is a third way of building a garage—to buy it ready cut, all ready for simple erection on the job, but very few firms in New Zealand supply these, and transport costs are an item in some cases.

Most New Zealand garages are built of wood, but asbestos sheets provide a very cheap and satisfactory substitute near the main cities. Another material from which garages can be very cheaply made is from the best of the timber from motor-car cases. Near the main centres there are usually firms which "break down" these cases, and can supply the pick of the timber at very reasonable rates. Particularly in the case of "baby" car-owners who want to economise to the limits on their garage, this type of timber can be recommended.

Laying Out The Job

THE novice usually finds his greatest difficulty in laying out the job, and making certain, first, that his base is absolutely square, and, secondly, that his walls are exactly vertical. Both are essential, and a little extra care taken in this part of the work is amply repaid by lesser time wasted later.

A Garage For The "Baby" Car

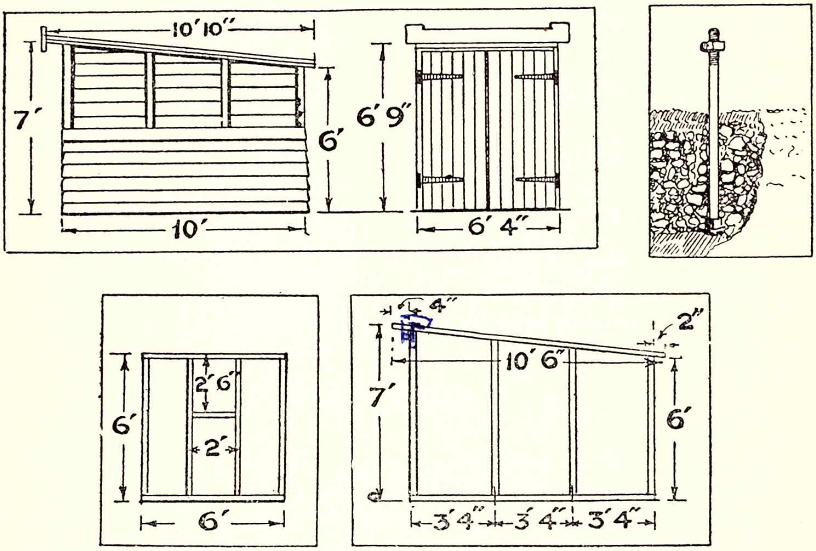
HERE is the easiest way to build a garage 10ft. long by 6ft. wide, which will house a "baby" car very satisfactorily. Needless to say, you can easily extend it to a larger size if you wish. The design is a little out of the ordinary because the roof is practically flat and slopes from front to rear instead of from the centre outwards. This makes for ease in building, and for the use of lesser quantities of material. It can be covered with roofing felt, and provided this is treated every few years with one of the bituminous compounds available for this type of roof, it will last indefinitely.

You will be wise to have a concrete floor, though this is not essential. For a small-car garage a depth of 2in. will be sufficient, but in the case of garages for larger cars you would be wise to have a 3in. floor of concrete. Use a mix of one part of cement to 5 of gravel (up to 1in.), and one of sand, and in the concrete set about three bolts for each side and two for the end, leaving them about 3in. above the level of the concrete. Grease the tops and cover with rag, and you will have no difficulty with the nuts when you are ready to screw down your garage on the base.

Building The Garage Sides

In order to make the building of the garage as simple as possible, we recommend that the work be done on the sectional system. That is to say, you will build, flat on the ground, both your sides, and the back of the garage, and then lift them into place, bolt them down, and fix the necessary braces to give the requisite stability to the whole structure. These sides and ends are very easy to make, because the timber has only to be cut to the lengths shown in the diagrams, and as it will be rough sawn 3 x 2, that is easy. Lay the timber flat on the ground and be very careful you have the corners square. Allowance is made for a small, non-opening window in the end frame, and it is an advantage; it can, of course, be omitted if you wish.

Having completed the framing, cut your weatherboards to the proper lengths, and nail them on to your frames. Commence at the bottom and work to the top, nailing in such a way that you have a nail in each case going through the thick bottom edge of your board, and the thin top-end of the board underneath. As your roof is sloping from front to rear, it will be necessary to saw the last two or three boards with the correct slope. You will find the easiest way to do this will be to proceed straight up with those boards protruding over the top edge, and when you have reached the top you simply saw downwards at the proper angle. If you try and cut each of those boards to fit you will have a lot of finicky work, and will waste time. Some of the wedge-shaped boards which are cut off can be used on the frame for the other side.



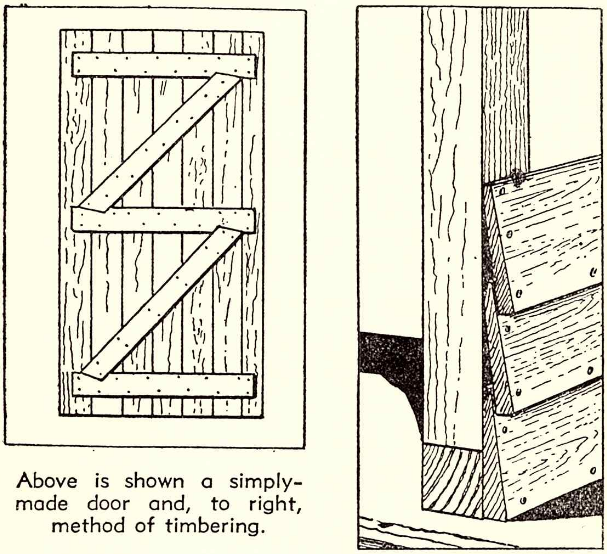
Details of the garage are clearly shown above. If you prefer it, you can use wire instead of bolts for holding the garage to the foundations, but bolts are preferable.

The only difference in the case of the end frame will be the cutting off of the boards to allow for a window frame. The whole of the work of constructing the frames should be easily done in an afternoon. Having completed them, you will want to measure accurately just where the holding-down bolts will come on the bottom members, and drill holes just a shade larger than the bolts to allow for any slight adjustment as you lift them into position.

Erecting The Walls

BEFORE you lift the walls into position cut your 3 x2 for the cross-members of the roof, so that you can nail them into position as soon as both your sides are standing upright. Get your first side, lift it into position over the bolts, and support it temporarily with a cross brace. Do the same with the opposite wall, then place the end wall into position and bolt the corners together with long coach bolts, the bolt heads being outside the building, and the nuts and washers inside. Tighten down the nuts on the bottom frame, then erect your cross-pieces between the two walls, and you are ready to proceed with the roof.

Your roof slopes from front to back, and it will also be wise to have just a slight slope from the centre to both outside edges. This is accomplished by having your 3 x 2 centre-piece in the roof, just slightly above the level of the outside edges. Then, when you nail down the timber over which your bituminous roofing is to go, it will bend slightly, giving you the run outwards you wish for. Several different types of cheap timber are suitable here, and if motor-car case timber is available, it will do admirably. Otherwise use 6 x ½in. in O.B.R., which is fairly cheap. Nail first to the centre-piece, then to the outside edges. To give the front of the garage a neat appearance, you can have a wide "fascia" board, the construction of which is perfectly simple, and can be seen from the diagram. Your tarred felt roofing material can then be laid, taking care that it is kept tight down on the roof, and that the joins are well treated with the joining material you will get when you buy it, or else with a bituminous substance.



Above is shown a simply-made door and, to right, method of timbering.

The Garage Doors

THE usual way of making the doors is shown in a diagram. They can be made of 6 x 1in. tongue and grooved boarding with braces. Make the doors a couple of inches smaller than the space between the ground and the top of the garage, then fill in that space later with an odd board. They can be hung on good strong T hinges, which should be screwed down with the longest possible screws. The final fittings of bolts and padlocks will depend on the location of your garage.

Having completed your building, you will be wise either to creosote it, both inside and out, or to paint the outside. If you are using cheap timber, creosote has the advantage of preventing the inroads of the borer; it is, moreover, very cheap (from 3/- to 4/- a gallon in the cities), and gives the boards a good dark-stained appearance. The cheapest paint would be to mix up a little chocolate paint from linseed oil and red oxide in oil, add a little black to get the desired shade of chocolate, and a little terebine to make it dry.

Building A Larger Garage

BROADLY speaking, whatever the garage you are building, the methods which have been described, will, in the main, apply, and, in giving some details of this larger garage, we will not repeat many of the constructional details. Here, again, you can save time and trouble by building the sides and rear of the garage on the ground, and then erecting them, but, because of its greater size, they are much heavier, and you will want two assistants when you are erecting them into position. Similarly, any adaptation can be made. For instance, in some cases it may be desirable to have a door half or three-quarters way down the side of the garage, so that you can get down to your

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house more easily. A slight adjustment in the placing of your studs will let you get this door in, and in the same way you could have windows down either or both sides, and a work bench at the end, if room were available. There is no difficulty, either, in making the garage longer or wider or both, because that is simply a case of adjusting the lengths of timber you will need.

This garage is 16ft. 6in. long and 8ft. 6in. wide, and is sufficiently large to accommodate the medium-sized cars and to allow a work bench at the end. Here again, we would strongly recommend a concrete base. The studs are cut 7ft. 6in. long, and are at 1ft. 6in. centres; that is to say, that from the centre of your 3 x 2 stud at one end, to the centre of your next 3 x 2 stud, will be eighteen inches, and so on right down the side. This garage is built with a galvanized-iron roof sloping out slightly from the centre to the sides, and not from front to back, as in the previous garage.

The materials you require for it are:—

320 running feet of 3in. x 2in. rough sawn O.B.R.
42 running feet of 4in. x 2in. rough sawn O.B.R.
700 running feet of 5in. x 1in. rusticating, planed and dressed.
100 running feet of 6in. x 1in. rough sawn O.B.R.
22 sheets of 5ft. galvanized corrugated-iron.

The 3in. x 2in. rough sawn timber is for the studs, cross-pieces and the braces, and the 4 x 2 for the bottom plates, to which the garage will be attached to the ground. The 6in. x 1in. rough sawn timber is for use underneath the iron roof—3 lengths are used on each half of the roof, and the iron is nailed down to it.

There are no difficulties likely to crop up in building a garage like this. If you want to make a larger one still, draft it out roughly on paper before you start, and you will find it easier.

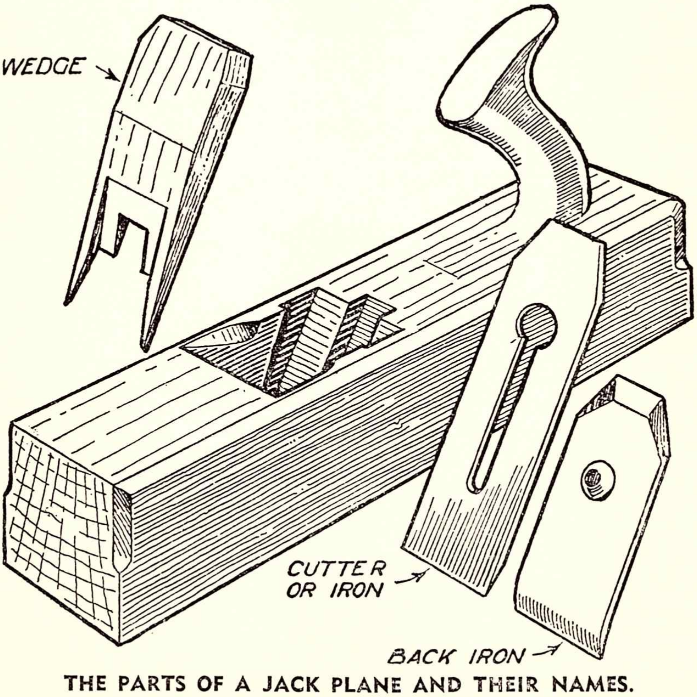
◆

Looking After Your Tools

SURPRISINGLY few amateur carpenters have much idea as to the care and attention which tools need if they are to be kept in first-class condition, and in fact there are quite a number who have little or no idea of doing even such a simple thing as setting a plane. This short chapter is intended as a general guide, and while it deals with only a few of the tools in everyday use, the principles are much the same, and anyone who knows how to sharpen plane irons and chisels has a pretty fair idea as to how to sharpen other tools also.

There are two types of plane generally used by amateurs, the jack plane and the smoothing plane. The first thing you want to know, is how to set the plane. The parts on the plane are shown in the diagram. The back iron is fixed to the cutter with a screw. Pass the screw through the hole in the cutter, and slide it up until the curved edge is near the cutting edge. The actual distance from the edge depends upon the work to be done. As the object of the back iron is to break the shavings and prevent the grain from tearing out, it is fixed within about 1-32nd of an inch for fine work and 1-16th or more when coarse shavings are to be taken off.

Having tightened the screw, the whole is replaced in the plane, cutter downwards. Hold the plane with the left hand so that the thumb presses on the iron, put in the wedge loosely, and hold it so that the sole or bottom of the plane is in a line with the eye. The cutter



THE PARTS OF A JACK PLANE AND THEIR NAMES.

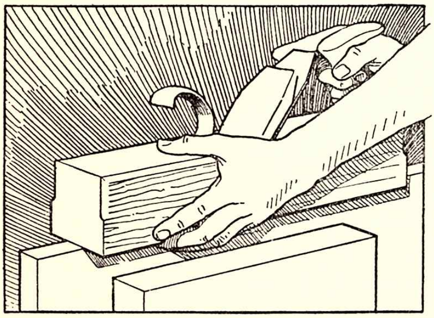
should appear as a thin black line. When it seems correct, tap in the wedge and once again look along the sole. If it is out too far, tap the rear of the plane lightly. If not enough, strike the iron. The jack plane is set similarly, except that the front of the plane is struck instead of the rear.

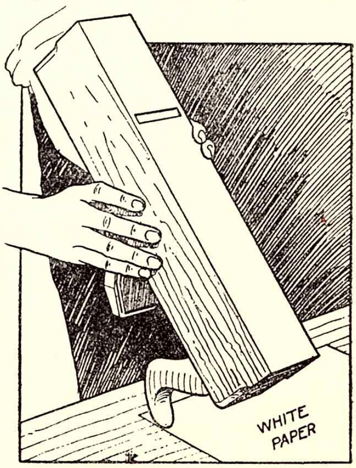
Sharpening The Plane Iron.

UNLESS the plane edge is keen, and the plane properly set, it cannot possibly do good work. When the plane comes to you from the shop the iron is not sharp; it is merely ground. A keen edge is given by rubbing it on an oil stone—preferably one with a fairly smooth surface. Release the iron by tapping the plane sharply with the hammer; some planes are provided with a proper striking button for the purpose. The effect of this blow is to loosen the wedge, enabling the iron to be withdrawn.

After removing the back iron, pour a few drops of oil on the oil stone and place the cutter on it, bevelled side downwards. To find the correct angle at which to hold it, allow the bevel to rest on the stone, and then raise it *slightly* so that the edge alone rests on the stone. Work the cutter back and forth with an elliptical sweep. Keep an even pressure throughout and make sure that one side is not sharpened more than the other, the result of which would be to put the edge out of square. The result of this rubbing is to cause a burr to be formed, and this is a sign that it is sharp. To tell whether the burr has formed, draw the thumb across the flat back edge of the cutter so that it lies *flat* on the stone, and rub it up and down once or twice. The object of this is merely to remove the burr. It is impossible to over-emphasise the importance of keeping the iron flat.

The three most common faults experienced in planing, are choking, chattering, and the delivery of coarse shavings, so we will deal with each in turn. The commonest cause of choking is a badly fitting back iron. It is essential that its curved edge beds tightly against the cutter throughout its length. Otherwise shavings force their way between





Right: Setting the plane. Above: Holding the plane when edge planing. Note how the fingers pass beneath the sole and act as a good fence.

the two and at once cause trouble. The remedy is to file the back iron until it makes close contact everywhere. The two should be placed together and held up to the light, when any discrepancy will become noticeable. A badly shaped back iron may also cause choking. It is a mistake to enlarge the mouth of a plane unless the shavings really cannot pass through it. For good fine work, a small mouth is an advantage.

Chattering is caused by the cutting iron not bedding down properly. It vibrates slightly and makes a long even shaving impossible. It can usually be corrected by glueing a strip of thin leather to the wood, where the bevelled part of the cutter touches.

Coarse shavings are generally caused through the sole of the plane not being true. As a rule the surface immediately behind the mouth stands up. The only thing to do is to re-plane it with a finely set plane, preferably an iron plane, known to be true. When this is done the iron and the wedge should be in the plane (but the cutter must be well in so that damage will not be done) because the wedge tends to draw the plane slightly away from the true.

A Few Hints On Buying a Plane.

A CARPENTER'S plane of any description is a tool requiring a great deal of skill and experience to produce, and it is a mistake that many amateurs make, to expect a very cheap plane to give as good service as the more expensive article. For this reason we strongly suggest that when you are buying a plane you decide to pay a fair price. Almost invariably you will find that this policy is the cheapest in the long run, for a plane is a tool which, with care, lasts for many years.

In cheap planes there is not the material in the iron or cutting plate, and these parts do not stand up for any length of time to repeated sharpenings. All things being equal, it often happens that a really good second-hand plane is a better bargain than a brand new one that is too cheap to be good.

As with all cutting tools, the blade of a plane must be most carefully protected from the damp. With a metal plane the sole should be run over occasionally with an oily rag, and while this is not necessary with wooden planes, it is a good plan to place a few drops of oil on the cutting edge now and again, and to rub this evenly over it to prevent it rusting.

How to Care for And Sharpen Chisels.

THE chisel may be regarded as a maid of all work tool of the woodworker's kit. It comes in for so many jobs. There are few joints that do not call for its use to a greater or lesser extent, and it comes in for the hundred and one jobs in general bench work. The home craftsman doing only occasional work will probably be content with one chisel, and in this case the 1in. firmer chisel is the most useful. It is stout enough to stand fairly heavy usage, and it is not too clumsy for comparatively fine work.

A useful addition to the kit is the half-inch firmer chisel. It is handy for cutting joints which are too small for the larger size. The writer has also found that to have a two-inch chisel in the tool set is a definite advantage in that you then have at your command every size necessary for all types of work that are likely to be experienced in the home.

It goes without saying that a properly sharpened chisel is essential to good work. No amount of force will make a clean cut. When first obtained it is not sharp, the edge has been merely ground on a grindstone. This gives far too coarse an edge, and finishing off on the oil stone is essential.

Pour a few drops of oil on to the stone, and, holding the handle of your chisel in your right hand, place it with the bevel resting on the stone. It is important that it is held at the right angle, and to find this, hold the chisel so that the entire bevel rests on the stone. Then raise the handle the slightest amount. This brings the edge only on to the stone, but at a very acute angle with the bevel.

If an attempt is made to sharpen at the same angle as that at which the chisel was originally ground, the edge is too thin to stand up to its work, and is liable to turn up. In any case it makes the sharpening a long and tedious job. On the other hand, raising the handle too much gives too thick an edge, which robs the tool of much of its keenness. In actual practice it will be found that after continual sharpening, the sharpening bevel becomes higher and higher, the result of which is that eventually it needs to be re-ground.

How To Tell The Edge Is Sharp.

TO return to the sharpening on the oil-stone, the left hand should be placed on the blade to give the necessary pressure and to guide the chisel. Work it back and forth with an even movement, varying the actual path on the stone so that the stone is not worn unevenly. Some workers prefer to keep the edge of the chisel square on the stone; others hold it slightly obliquely. It is immaterial which method is adopted provided one side is not sharpened more than another.

After a little practice a keen edge can be recognised by sight. A sharp edge can scarcely be seen as there is nothing to reflect light. A thin white line at the edge is generally an indication of a dull edge. There is another test, however. The rubbing on the stone causes a burr to be turned up at the back or flat side, and this can generally be regarded as a sign that the edge is sharp. The ball of the thumb should be drawn across the edge at right angles, when the burr is at once apparent. Until this appears, it can be taken that the chisel is not sharp.

To remove the burr the chisel should be laid with the flat side flat on the stone and moved back and forth a few times. It should be noted that it is most important that the chisel is held flat, because a bevel at the back ruins it. The only purpose of reversing a chisel is to remove the burr. It is a good plan to keep a piece of soft leather stuck down on to a flat board so that the chisel can be afterwards stropped similarly to a razor. This gets rid of any burr that may still hang to the edge, and gives a fine, keen finish.

Chisels are amongst the most delicate tools carpenters have to use, and too much care cannot be taken to ensure that the cutting blades are protected from damage, especially from rust. Rust has a corrosive effect, and, far too much honing or rubbing down is necessary to remove the spots.

In a workshop that is apt to be in the slightest degree damp, the wise way is always to wrap up one's chisels immediately after use. An old piece of wash leather makes an excellent wrapping material, and the tools should, when wrapped, be put away in a drawer or well-fitting box. If a chisel is to be laid by for any length of time, the bright parts may be wiped with an oily rag, but it is essential that the blade shall not be in the least degree oily when one uses the tool again or an accident may occur—or spoilt work through slipping.

An ultra-cheap chisel is usually an abomination, because the metal it contains will be too poor to stand up to hard work and constant sharpening. Frequently a second-hand chisel of really first-class make is to be preferred to a brand new article of an inferior quality, and second-hand tools are often on sale at pawnshops where many a bargain is to be found.

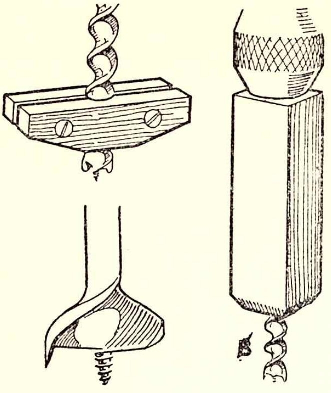
Buying And Caring For Saws.

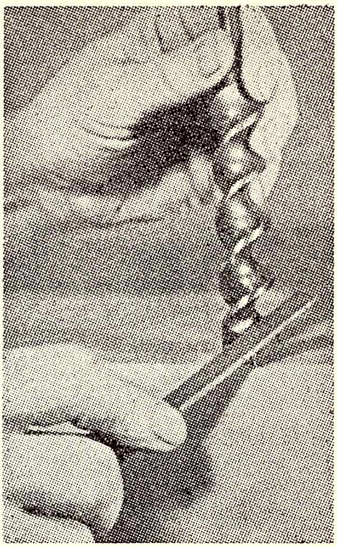
ALTHOUGH it is as important that the saw is kept as sharp as other tools, it is the one case in which it is not advisable for the amateur to attempt to sharpen his own. The fact is, that it is a job requiring a considerable degree of skill. We may say at once then, that when a saw loses its sharpness, it should be taken to a professional saw sharpener. If this is done the teeth will retain their regularity and will be properly set.

Anyone who wishes to do a fair amount of woodwork needs at least two saws, a crosscut and a rip saw. In addition, a cheap key-hole saw will allow you to do various tricky jobs involving the cutting of circles in wood, or such like. Unless you are likely to use the keyhole saw frequently, one costing two or three shillings will suffice, but so far as the other saws are concerned, you should buy nothing but the very best—in fact it would be better to buy one really good one and use it for both types of sawing rather than buy a couple of cheap saws which wouldn't stand up to sharpening and resetting. A really good saw today costs in the vicinity of £1—in some cases a few shillings more, but don't on any account be misled into buying one at half that price, if you intend to do a good deal of woodwork. The saw that costs £1 will last indefinitely, and will always sharpen and set well; the one that costs 10/- will never do good work, and will constantly need re-sharpening.

How To Use The Brace And Bit

RATHER than bother cutting out wood to make dovetail or tenon joints when making furniture, the average amateur prefers to bore holes and use dowel pegs, and provided the holes have been accurately





Top left: One type of depth gauge. Bottom left: Improved type of centre bit. Above: Another depth gauge. Right: Twist bits must be filed very carefully.

bored strictly at right angles, these are very nearly as effective. But if the holes are not bored true, the strength of the article is considerably reduced. There are a few points worth knowing, firstly about the way to use a brace and bit, and secondly about the small degree of care needed to keep these in first-class order.

If you have done very little woodwork it will be a good plan to put a small mirror at the rear of your bench, and in front of it place your square. In front of that again, have a piece of wood into which you can practice boring holes. By watching the mirror and seeing that the bit is in line with the square, you can be certain of boring holes that are perfectly true. An hour or so spent in this way, by the amateur who has seldom or never used a brace and bit, is time well spent. Once you have acquired the knack of boring true holes, you will never lose it.

The twist bit is the one most used, although the type of centre bit illustrated, is very useful for boring holes to a limited depth. If you are boring deep holes in the ends of wood, the twist bit is the one to use. The way in which the bit should be sharpened is illustrated. This needs doing now and again or the bit will not "nick" into the wood easily. Care is needed to make certain that you sharpen at the same angle as already exists. It is essential to see that the screw centre of the bit is not touched with the file or it would be thrown out of true, and the bit would not then bore true holes. A good plan is to stick the point into a piece of soft wood, and then rub the file lightly across the bevel of the cutter, carefully maintaining the same angle. The bit should be sharpened lightly as it will only stand up to sharpening a few times.

How To Use A Depth Gauge When Boring

FREQUENTLY when you are making a cupboard, you have to bore a whole series of holes to a standard depth. There are several ways in which you can do this, by using a pencil and putting it into the holes periodically to make certain that you are nearly at the correct depth, or by tying a piece of cotton round the bit at the proper depth, but the most effective of all is to have a depth gauge similar to those shown in the illustration. These can be obtained at any tool store and they effectively ensure absolutely correct work. On the other hand you can easily make one yourself if you take the trouble. If you want to do accurate work, and frequently need to make holes at angles, it would pay you to use a dowel jig which provides you with a depth gauge, and a series of jigs which can be placed at any angle. They are fairly expensive, and are only worth while buying if you intend doing a lot of work, such, for instance, as making the whole of your own furniture over a period of months.

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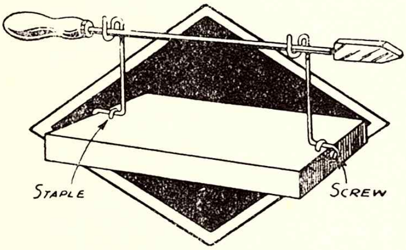
How To Solder

THE equipment required for soldering jobs in the home is simple and inexpensive but with a little practice and careful attention to four golden rules, the man who can use his hands, can do all kinds of useful and money-saving jobs, both in the house itself and in the garage.

The outfit consists of two soldering irons, a spirit lamp or a Bunsen burner for heating the irons, and a supply of solder. To this may be added the two very useful little gadgets illustrated in Figs 1 and 2. Each of these can be made in a matter of minutes, and their cost is negligible.



1. Stand for holding the iron.

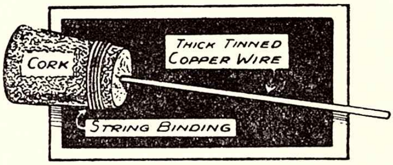
The first of these is a stand for holding the iron whilst it is being heated. It consists, as will be seen of a block of any kind of wood, and may be about 6 inches in length by 3 inches wide. To the ends of this are fixed two arms made from an old bicycle spoke, or from stout copper wire. The arms are easily bent into the shape indicated, with the pliers. Each is secured in position by means of a screw, passed through a ring formed in its lower end, and a staple. The arms should be made such a height that when lying across them, the point of the iron is level with the upper part of the flame of the lamp or Bunsen burner that is to be used for heating purposes. This stand serves as a kind of third hand. Whilst the iron is heating one's own hands are free to arrange the work to be soldered which is a very great advantage. Further, it prevents those little regrettable incidents affecting table cloths and table tops, which are apt to occur if there is nothing to receive a hot soldering iron when it is put down for a moment.

Tinning Soldering Bit

THE second gadget seen in Fig 2 is even simpler to make. It consists of nothing more than a largish cork into which is inserted one end of a rather stout piece of tinned copper wire. This tool greatly simplifies the process of tinning with which we will now deal.

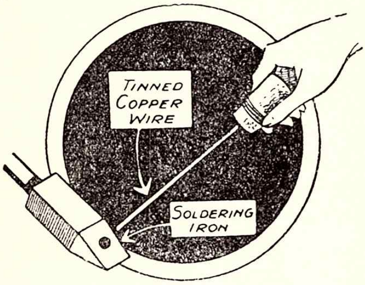
When it is purchased from the tool shop, the "bit" of the iron consists of a suitably shaped piece of plain copper. Before it can be used for soldering jobs the point must be "tinned." This means simply covering it with a thin layer of solder.

Having smoothed the iron with a file, place it in the stand, arranging it so that the bit is in the heating flame. The actual appliances used for heating will be dealt with in a moment. Dip the bit in the flux, and allow it to warm up until it



2. A tool for simplifying tinning.

will just brown a piece of newspaper. Hold the iron in the left hand and rub the point on a clean piece of rag. Holding the iron in the left hand with one of the flats of the point uppermost, take a stick of solder in the right, and with it touch the point of the iron. A little blob of solder will form as in Fig. 3. Take the tinning tool in the right hand, dip its end in the flux, and then proceed, as shown in Fig. 3, to spread the blob of solder evenly over the face of the bit.



3. Spreading the solder.

Deal with each of the flats in the same way, until the point is nicely tinned for about $\frac{1}{2}$in. upward all round. If you find that you have got more than the thinnest covering of solder on it, warm up the iron again and wipe off any surplus on your piece of rag.

Best Heating Method

NOW a word about the means of heating the iron. It was recommended at the beginning that two soldering irons should be purchased. One of these is intended for fine work, and should be quite a miniature affair. That which I use myself for small jobs has a bit only $1\frac{1}{4}$ins. in length, and about $\frac{1}{2}$ in. square at the biggest part. This is the handiest possible tool for all wireless and electrical work and for all kinds of little jobs. Such an iron is readily heated by the kind of spirit lamp used for boiling picnic kettles. A spirit lamp has the advantage of producing a hot, clean flame, and of being so readily portable that it can be used anywhere.

The disadvantage of a small iron is that it cools very rapidly. It is therefore no use at all for large jobs, such as repairing spouting, etc. The work itself is, of course, an excellent conductor, and owing to its large surface area, it very readily radiates away heat from the iron when the latter is applied to it. The larger iron may conveniently have a bit weighing 4 ounces or more. This cannot be heated in a spirit lamp, but the domestic gas ring will do perfectly well.

A Bunsen burner or a gas ring may, of course, be used for heating the small iron as well, though great care must be taken to keep the flame low. The first golden rule of soldering is never to let the iron become anything like *red hot,* or the tinning will be burnt off the point.

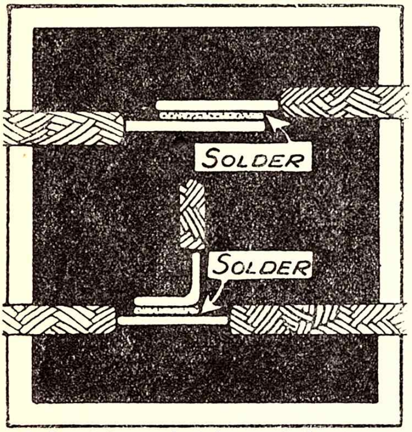
The remaining three rules may be stated now. The second is always to have the iron hot enough. Most of the messy jobs made by beginners owe their unsightliness and insecurity to the use of an iron that is too cool. The tip already given for testing the iron on a piece of newspaper is a good one. Another, equally valuable, is to watch the iron as it heats up, and to wait until the flame surrounding the bit begins to take on a pronounced greenish colour.

The third golden rule is always to use a perfectly clean iron. For this reason a coal fire must never be used for heating purposes. If the tinning on the point looks dull, always wipe the iron on a piece of rag before trying to solder with it.

Should the point be very bad, or should black pits appear in it, it must be filed up and retinned.

Clean Bright Work

THE fourth golden rule is that the work itself must be absolutely clean and bright as regards the parts to be soldered. Solder cannot adhere to a dirty or oxidised surface. It may appear to do so at the time, but sooner or later (probably sooner) a soldered joint made between dirty surfaces will come apart.

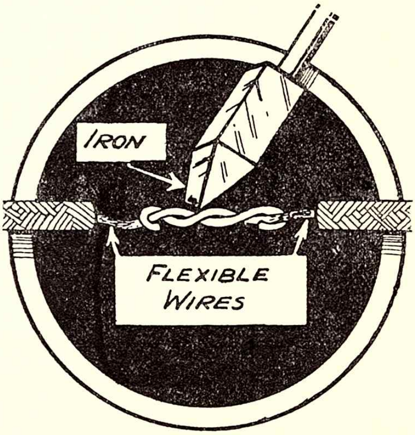


4. Straight and right-angled joints.

A very large part of the work done by the home solderer will be concerned with wireless and other small wiring jobs. These jobs consist in the main of joining two wires, wires to terminals, and wires to tags. Fig. 4 shows how straight and right angled joints are made between plain wires. Remove no more insulation than is necessary, see that the wire laid bare is clean, and lay the parts to be joined together as shown in the drawings. Apply a very little flux—remember that too much flux is fatal to neat soldering—heat up the iron to the right temperature, and take a little solder on its point. Keeping the wires firmly together, run the point of the iron along the joint. Provided that the work is clean, and that the iron is hot enough, solder will flow evenly, filling up the hollow between the two wires, and making a sound, neat job.

Stick To Simple Jobs

IT has been assumed that the wires to be joined are tinned copper, since these are generally used in wireless sets. If, however, they are of plain copper, each of them must be tinned before the joint is attempted. This is done by applying a little flux to the bare portion, taking a small amount of solder on the point of the iron, and making it run over the surface of the copper. Flexible wire very often consists of untinned strands. Before soldering, straighten out the strands at the bared end and brighten them by scraping gently with an old knife. Then twist together and tin as already described. Fig. 5 shows how a joint is made between flexible wires. The two ends are twisted tightly together. An application of flux is made, and a

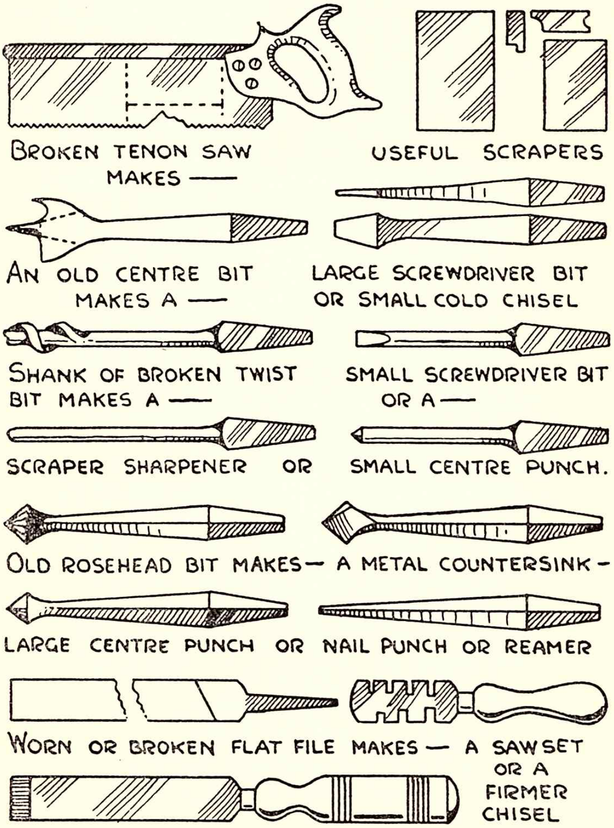


5. Soldering flexible wires together.

little solder run-in completes the job.

Until he has had considerable experience, the home solderer will be well advised to confine his efforts to the easier metals—brass, copper, bronze copper, zinc and tin—tin includes the material commercially known by that name which consists really of sheet iron tin plated.

Repairs to toys, to kitchen utensils and to household fittings are often concerned with a joint between two flat surfaces which have given way. Here is a simple method of dealing with these. Scrape each of the surfaces to be joined, apply a little flux, and use the iron to ensure that each is lightly and smoothly tinned. Place the tinned surfaces together and hold them tightly in position with a pair of pliers or any convenient tool. Heat up the iron and press it firmly down until the solder is seen to run out from the edges. Finish off the job by running a little solder with the point of the iron round the edges of the joints.


BROKEN TENON SAW
MAKES —
USEFUL SCRAPERS
AN OLD CENTRE BIT
MAKES A —
LARGE SCREWDRIVER BIT
OR SMALL COLD CHISEL
SHANK OF BROKEN TWIST
BIT MAKES A —
SMALL SCREWDRIVER BIT
OR A —
SCRAPER SHARPENER OR
SMALL CENTRE PUNCH.
OLD ROSEHEAD BIT MAKES — A METAL COUNTERSINK -
LARGE CENTRE PUNCH OR NAIL PUNCH OR REAMER
WORN OR BROKEN FLAT FILE MAKES — A SAW SET
OR A
FIRMER
CHISEL

SOME OF THE SIMPLE CONVERSIONS YOU CAN MAKE.
Most old tools can be adapted for other purposes.

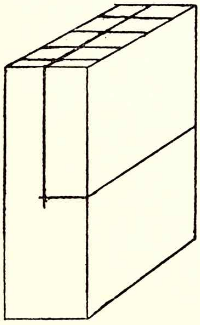
Joints You Will Use

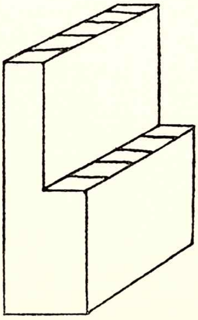
THERE are many different ways of joining wood together from simple nailing and screwing to all sorts of complicated joints which take a great deal of care and application in laying out. The object of this chapter is to give you the necessary information about those joints commonly used in woodwork. The real object of jointed work is to provide the maximum surface for the glue, and the more complicated the joint is to make, the greater its effectiveness as a general rule. One of the great advantages of building furniture into an existing wall is that the rigidity of the wall usually makes it unnecessary to do any complicated work, and nailing or screwing is all that is needed. For the making of drawers, however, and for the finer types of finishing, a knowledge of jointing is essential, and the simple diagrams which accompany this article will give you all the information you need. If you intend trying jointing work for the first time, we strongly recommend that you should practise for an hour or two with pieces of wood which you don't intend using.

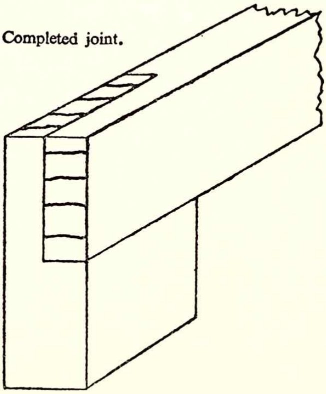
THE mitre joint is a simple one used for picture framing and other light work where it is necessary to join two pieces of wood at right angles. The end of each length is sawn across at an angle of 45 degrees, the cut of each length placed together and the joint secured with glue, nails or screws. Added strength can be given by screwing in a wooden "key" to the joined pieces of wood.

The halved joint which is illustrated, is used for joining timber either at right angles or lengthways. It is easy to make and yet withstands great strain. It is most satisfactory when the wood which is being used is fairly thick, and a combination of glue and screws is ideal where it is used.

To make the joint at right angles you simply saw off one end of both pieces dead square. If they are both of the same width, mark back from the sawn end of each piece a distance equal to the width of the wood. Then mark half the depth of the wood, carefully using marking gauge or pencil, and saw to the marked points, taking care to see that you exactly follow the mark,


(*a*) One member of joint marked out.

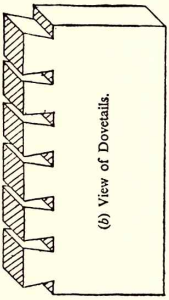

(*b*) One member of joint when sawn.

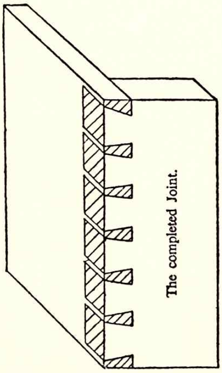

(*c*) Completed joint.

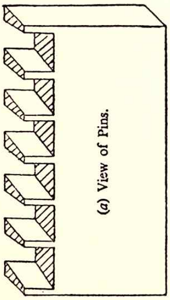
and thus have both joints absolutely true. Any slight irregularity in sawing should be made good with the chisel later.

The dovetail joint is mainly used for joining relatively wide but thin pieces of wood at right angles, and it is very neat and strong. It is used most frequently in making boxes, drawers, etc. The dovetails themselves are cut on one piece of wood and the pins on the other, the dovetails usually being on the longer of the lengths being jointed. There are two alternative methods of making the joints, (a) by making the pins first and marking out the dovetails from them, and (b) by reversing that procedure. There is little to choose between either method.

A pin is always to the left on the two outside edges of the joint, and not a half dovetail. The slope of the pins (and consequently of the dovetails also) should be about one in eight. Their thickness at the narrowest side should be one quarter the thickness of the wood being used. With regard to the dovetails, these at their widest part should normally be between one a quarter and one and a half times the thickness of the wood.


(*b*) View of Dovetails.


The completed Joint.


(*a*) View of Pins.

A Practical Illustration

TO see how this works out in practice assume that two pieces of wood $9\frac{1}{2}$in. wide by 1in. thick are to be dovetailed. We will carry it out by the method of cutting the pins first. Saw off one end of both pieces of wood dead square. Measure back from the end of each piece a distance of 1 1-8in., i.e., the thickness of the wood plus 1-8in. to enable the pins to be pared off neatly afterwards. Scribe a chisel around all four sides of both pieces of wood at this distance, and turn one piece of wood up so that the measurements for the pins can be made along the end grain. According to the information given above the thickness of the pins in this joint must be $\frac{1}{4}$in. at their narrowest.

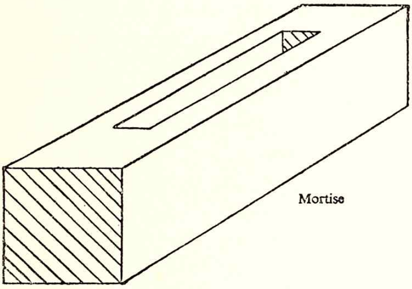
From each edge and along the face side mark in a distance of $\frac{1}{4}$in. for the two outside pins. This leaves 9in. to be divided up among the remaining pins and dovetails. There will be one more dovetail than there are pins and a little rough marking out on a rough piece of wood will show that the figures that most nearly approximate to the rules given previously are six dovetails with five pins.

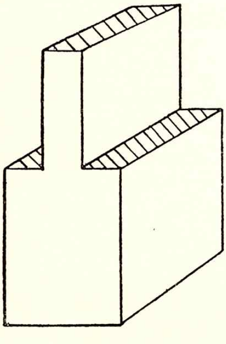
Mark the centre points of the five inside pins at a distance of $1\frac{1}{2}$in. apart along the face-side. Rule the centre lines of pins right across the end grain and then mark a distance of 1-8in. on both sides of each centre line to mark the thickness of the pins on the face-side.

As already explained the slope of the pins must be one in eight and as in this case the wood is 1in. thick it is obvious that the difference in measurement between the narrowest and the widest part of each pin will be 1-8in. on each side of each centre line.

On the opposite edge of the end grain to that already marked, measure in from each edge a distance of 3-8in. Draw pencil lines from these two points to the two outside $\frac{1}{4}$in. markings on the face-side and the requisite bevel for the pins will thus be obtained.

If the worker is in possession of an adjustable bevel all that needs to be done is to adjust the blade to the slope so marked, and mark off each pin in turn. Should he not own a bevel he must mark off $\frac{1}{4}$in. on each side of the centre lines of pins on the back edge of the wood and connect them to the markings on the front edge.





Having marked the bevels rule lines, with the aid of the square, down to the shoulder line previously scribed around the four sides. Saw down the outlines of the pins to the shoulder line with a dovetail saw, and chip out the waste wood between the pins with a mallet and chisel.

When doing this, start about $\frac{1}{4}$in. away from the shoulder line. Place a suitable sized chisel between a pair of pins, give the top a sharp tap with the mallet, shift the chisel about another 1-8in. up and tap it in at a slight angle, so removing a small chip of wood between the first and second cuts.

Repeat this operation until half the thickness of the wood has been chipped through, then turn the wood over and repeat the chipping from the other side until the waste wood has been completely chipped out. The fact that the pins slope from back to front should not be lost sight of, and care must be taken not to allow the chisel to cut into a pin. When the greater part of the waste has been chipped out the remainder can be pared off neatly with a chisel down to the shoulder lines (see a).

Having completed the pins, stand them upright on the piece of wood reserved for the dovetails so that their "bases" (i.e., the thickest part of the pins) rest on the shoulder lines.

Mark round the outline of each pin with a pencil.

Saw down these pencilled lines to the shoulder lines with a dovetail saw and remove the small portion of waste between each pair of dovetails with mallet and chisel. The two outside portions should be sawn off, not chiselled. The completed dovetails will then appear as (b).

The finished joint should be "hand-tight"; that is to say, it should be capable of being fitted without being hammered or tapped, but merely by a slight pressure of the hands when fitting the pins into the dovetails. If tapping is found to be necessary a small piece of wood should be laid on each dovetail in turn and the blows struck on to the wood and not directly on the joint.

If correctly jointed the two pieces of wood should form a perfect right-angle, a point of great importance in the making of boxes, etc. It is therefore as well to fit the joint together and check the angle with the square before any attempt is made to glue up.

The joint is held together by the glue brushed on to the pins which are then pushed into place. In some cases it may be necessary for a nail to be driven in to one or more of the dovetails, but such a practice is not to be recommended and is usually only forced on the worker by his own careless work.

After the glue has dried the slight projecting portions of the pins and dovetails are planed off, care being taken not to split out the end-grain of the two outside pins. The completed joint will then appear as illustrated.

Mortise and Tenon Joint

THIS joint is used for joining wood at right angles and is one of the most important there is, as it is used for doors, windows, tables, chairs, gates, etc. The joint has two members as shown in the illustration, a tongue (or tenon) projecting from the end grain of one fitting into a slot (or mortise) cut right through the other. Usually the tenon is placed centrally and is one third the thickness of the wood being jointed.

Assume that the wood is 2in. wide, 1½in. thick, and that the mortise is to be driven through the 1½in. edge. Saw off the end of the wood intended for the tenon as square as possible and scribe a shoulder line around all four sides at a distance of 2 1-8in. from the end. On the face-edge of the wood for the mortise scribe two chisel lines 2in. apart where it is intended that the tenon shall fit. Continue these lines down the face side in pencil and across the bottom edge of the wood with a chisel. The tenon will have to be ½in. thick and be set in ½in. from each edge to conform to the rules given above.

The tenon is sawn out with a tenon saw, first down the length of the tenon and then across the shoulder lines. Squareness of cutting is essential if the joint is to be a success.

There are two alternative methods of cutting the mortise. The first and easiest method is to remove the greater part of the waste with a brace and bit, finishing it by trimming the ends and sides of the mortise with a chisel. It should be noted that the holes should only be bored half-way through the wood, which is then turned over for the same operation to be repeated from the other side. The alternative method is to chip out the mortise with a mallet and a suitable sized chisel (in this case a ½in. chisel).

Mortise and tenon joints for internal work are usually glued, and in external work paint or red lead is substituted for the glue. In doors, windows, and in framing, the joint is also "wedged" to give greater security.

Dowels For Jointing

THE various joints described above are those in common use in the best type of cabinet-making, but to make them involves a good deal of time and in many cases jobs almost equally as good can be carried out by using dowel pins. This is particularly the case where the articles being made are light, for dowels make strong, neat joints. "Dowels" are strong wooden pins, and you can buy them in various thicknesses and in lengths of about 3ft. from your hardware merchant.

Although dowels can be used for butt joints they are more commonly used for end-grain to edge jointing, and it is this form of joint that is explained below. One point that should be kept in mind when dowelling is that the diameter of the dowel should be equal to one-third the thickness of the wood being jointed.

To find the number of dowels required for any width of wood over 2in. work on the assumption that one dowel will be required for each 2in. of width but, when marking-out the dowel positions, mark the centre of the two outside dowels $\frac{3}{4}$in. in from the two edges and space out the remaining dowels equi-distant. When the width of the wood does not exceed 2in. one dowel placed centrally will suffice.

Saw one length of timber to the required length, paying particular attention to the squareness of the cut. Working from the face-side draw lines across the end-grain to denote the centre-lines of dowels in the positions indicated by following the instructions given in the preceding paragraph. With pencil and gauge duplicate these markings on the face edge of the second piece of wood so that when both are laid in their correct positions the centre-marks will coincide.

Using a brace and a bit of suitable size for the dowel, bore holes in the end-grain and face-edge to a depth of just over half the width of the wood, or to a depth of $1\frac{1}{2}$in., whichever be the smaller.

The dowels may either be made up by the worker himself by shaping a piece of hard wood with a chisel, or else purchased from a woodworkers' supply shop. They should be cut into lengths slightly less than twice the depth of the holes bored. Along the edge of each dowel a small saw cut is made to allow surplus glue to escape, whilst each end may be slightly tapered off to assist them into position.

Each dowel in turn should have one end dipped into boiling glue and is then tapped into place in one of the holes bored in the end-grain. When all dowels have been thus treated the projecting halves of the dowels are brushed with glue and are forced into place in the holes bored on the face-edge of the other piece of timber.

It is obvious that this joint will only be a success if the holes have been bored dead straight and care must be paid to that point. A cramp will be of great assistance when glueing a dowel-jointed framework.

How To Make A Glued Joint

WHERE you are making fairly wide pieces of woodwork, such as wardrobes, it is practically impossible to avoid the necessity for joining up two or more pieces of wood, and the only way to make a really first-class job is to use the rubbed, or glued, joint. In some cases a rubbed joint, that is one in which the joining edges are planed true and glued with no other method of strengthening, is all that is needed. For other jobs it is desirable to use either a tongue or dowels to make the joint secure. It depends mainly upon the use to which the work is to be put, and also in a measure upon the wood being used, because some woods take more kindly to the use of glue than others. Another consideration is the thickness of the wood, because it is impracticable to use dowels or tongues in thin stuff.

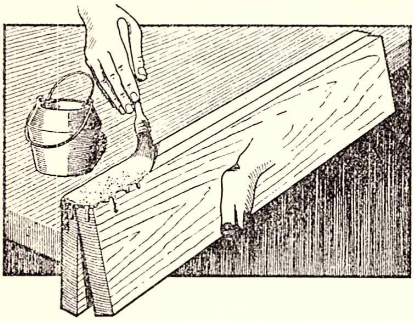


Fig. 1—How glue is applied to both pieces simultaneously.

A Strong Joint

WHEN properly planed and glued the rubbed joint has ample strength, at any rate in such woods that hold the glue well. In fact, if an effort is made to break it, the wood itself will often split rather than the joint itself. If carefully planed no cramps are necessary (except for very long joints)—in fact, it is better not to use them because the wood is then not under any stress. Joints up to 4ft. or so can always be rubbed together without cramping.

The first step is to mark the face side on both pieces, or on all if there are more than two. This is necessary so that the parts are always put in the same positions when being tried together. When several strips are being used it is generally advisable to have the heart sides alternately up and down so that any warping tendency is cancelled out as it were. The figure of the timber has also to be considered for show work since it is desirable for it to match as far as possible. This is specially necessary in the case of figured oak because large figure in one board and small in another show up very badly.

Aim In Planing

THE aim in planing the joint is to make every portion touch throughout the length, and to keep the parts in alignment. This means that the planed surfaces must be

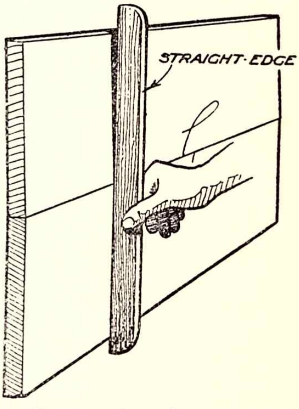


Fig. 2—Testing for alignment with the straight-edge.

free from winding and that no daylight must be visible through it in any part. Three tests should be made. The first, for alignment, is made by using a straight edge across the parts. Any inaccuracy is at once noticeable. The second, for winding, is made easily by seeing whether the one part rocks at either end upon the other. The third, for a close joint, is partly by sight, and partly by swivelling the top piece upon the other. There should be definite friction at the ends. If it appears to pivot easily at the centre leaving the ends free, it is a certain indication that the joint is round—a bad fault. If the joint is too hollow it can be detected by sight.

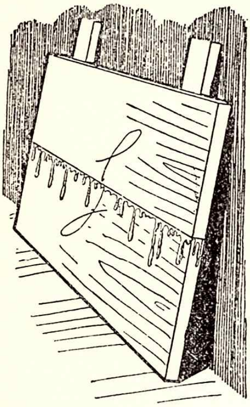


Fig. 4—How to stack jointed timber.

Now for the practical work. Any saw marks should be removed with the plane. The edge should be as square as possible, but this is not vital providing that a corresponding angle is planed on both pieces, the one sloping the reverse way from the other. In this way the two angles cancel each other and the parts go together in alignment. If it is desired to make the shaving thicker at one side than the other in order to correct any inaccuracy do not attempt to rock the plane (it is not practical in any case). Instead, push the plane over to the side where the thicker shaving is to be taken off. This will automatically do the trick.

Gluing Up The Job.

WHEN all is satisfactory the gluing can follow. The glue should be hot and of a consistency so that when the brush is held a few inches above the pot it flows down in an easy stream without lumps yet without breaking up into drops. Both parts of the joint should be heated to prevent the glue from chilling (though be careful not to burn the edges or the joint will show up as a black line). The remaining process should be rapid. One piece is fixed in the vice and the other held against it as shown in Fig. 1. The glue brush is drawn rapidly along as shown, and the top piece placed in position. Holding the wood at the ends as shown in Fig. 3, rub the top piece back and forth three or four times to press out surplus glue and to bring the surfaces into close contact. If by accident the joint is broken, that is, falls over sideways, immediately rub it again.

To stack the joint whilst it sets, lay it against a couple of battens as shown in Fig. 4, so that the wood is supported across its complete width. When there is more than one joint, the top piece is rubbed to the centre one first, and then these as a whole rubbed to the bottom one.

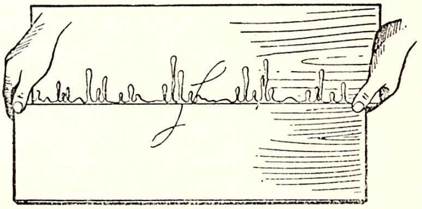
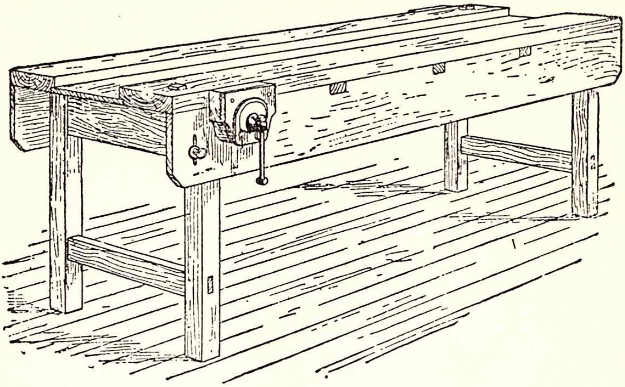


Fig. 3—Joint being rubbed.

A Home Work Bench



IF you intend doing a good deal of home carpentry, a work bench is essential. There is nothing more annoying to the enthusiastic amateur than to have to do his work in bits and pieces, putting all his tools away each time, and having to get them all together again when he wants to go on with the job again. There are many different types of work bench, all more or less satisfactory, and the type you favour will depend on the circumstances. Naturally, it is easiest to build a bench up against an existing shed wall, but if you have sufficient room, it is an advantage to be able to move right round the bench. If you build the bench against a wall, you can lay out your tools on a board on the wall behind the bench, and that is a tremendous help. Moreover, a bench so built is tremendously strong, and will last indefinitely.

The bench illustrated here could quite easily be built up against the wall simply by leaving the down board off the wall side, and nailing the legs and back brace direct to the wall.

A good useful size for a bench such as is illustrated is 6ft. long by 2ft. 6in. wide by 2ft. 8in. high. Before you decide the exact height, however, measure the height on a wall, and see whether that particular height suits you. If you are short, it may be a little too high, whereas if you are tall, you will be more comfortable at a bench several inches higher. This bench can be made in several ways. If you are building it against a wall, it will be strong enough if merely nailed together, provided you skew nail the legs, that is to say, put the nails in on an angle. If on the other hand the bench is to be an entirely separate fixture, the ends should be strongly glued together, and it will be a good plan also, in order to ensure greater strength and rigidity, to run two pieces of 4 by 2 from end to end (thus making a frame), and to nail or screw the top down on the frame.

The materials you will need for this particular bench will be:—

11 feet of 4 by 4 for the legs (3 by 3 would do).
4 feet of 5 by 2 for two pieces between legs.
4 feet of 4 by 2 for lower pieces between legs.

12 feet of 10 by 2 for two outside top boards.

6 feet of 10 by 1 for centre top board.

12 feet of 6 by 1 for side boards.

6 feet of 6 by 1 for extra brace running between the legs from end to end.

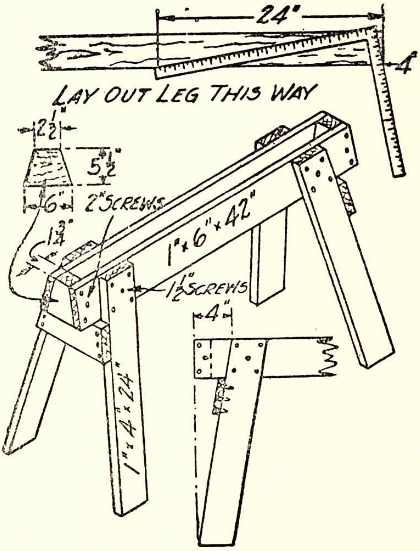
In addition to the above, if the table is to stand on its own, we recommend the making of a frame top which would take an additional 12 feet of 4 by 2. The total cost of the materials in heart rimu would be in the vicinity of 25/-. You would be wise to use good quality heart timber as this stands up to wear much better than O.B.

A small vice which can be screwed on the side as illustrated, and a low stop to allow you to rest a board against it for planing purposes (as shown near the vice) complete a very useful and inexpensive table. Various refinements can be added if desired. Drawers for certain of your tools, or divided into sections for nails and screws of different sizes, can be let into the side, or you can erect a back to the bench, and on that back lay out your tools, making loops of tape to keep them upright. You will work nearly twice as fast if you do arrange your tools in handy positions, provided you keep them there!

The reason why working benches are not made with flat tops is that it is much easier to sweep your nails and oddments into the central "channel" than to attempt to sweep them to the edge of the table. You will find that a bench built on these lines is strong and reliable, and that it will give you splendid service.

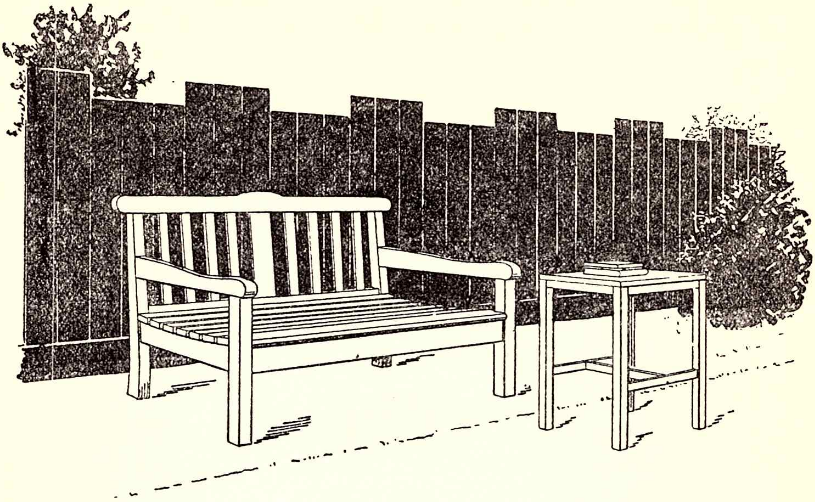
Handy Sawhorse

NO one can do efficient work around the home without a couple of sawhorses, and the open top type shown here is very satisfactory, and can be made out of odd pieces of material. The chief advantage of the open top type (and this one can equally well be made without the open top if desired) is for ripping short boards and for holding a stick or a handle in a vertical position where a vice is not available.



The sawhorse will be much more rigid if the joints, in addition to being screwed are treated with casein (or other waterproof glue) just before they are put together. Needless to say they will last much longer if given a couple of coats of good quality paint such as Bergers. If intended for use with fairly heavy timber, the legs should be made of 4 by 2in. and the cross-braces of 8in. by 1in. The diagram illustrates very clearly the way to construct it and how to get your angles.

A Handsome Garden Seat



WE are giving two different types of garden seat, because there are so many people who would like to have one of these, that we thought it wise to provide plans and information about a very simply made one, as well as the information given here about a really handsome and well-finished seat that would look well anywhere. It is shown to a width of 4ft. 6in., but can, of course, be made in any width desired.

Ordinary glue is pretty well useless for articles that are to stand out in all weathers, so the wisest plan is to peg all joints with hardwood dowelling, after having thoroughly painted all bare surfaces that are being joined together. An alternative method is to use brass screws and screw the joints, or to use the two in combination. The seat is best made in oak or Australian hardwood, but could be heart of rimu, provided care were taken to paint all joints particularly well, and then to give it several coats of a really high-class paint, such as Taubmans. Moreover, it

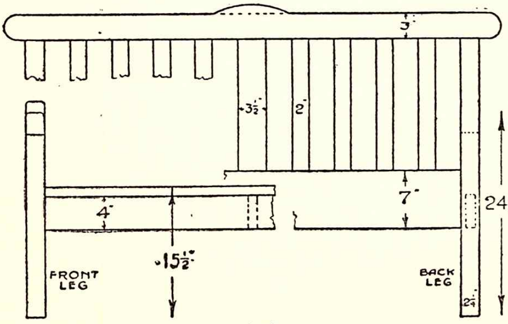


FIG. 2. FRONT ELEVATION.

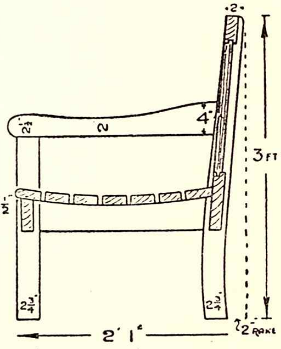


FIG. 3. SECTIONAL END VIEW.

must be kept well painted if made in rimu.

Features of the seat are: (1) strength, always provided that the joints are sound; (2) a convenient sitting height, with or without cushions; (3) a curved seat, which makes for additional comfort; (4) liberal depth from front to back; (5) shaped arms, which afford a nice elbow rest; and (6) a rake at back which, without presenting any difficulty in construction, offers both repose and support.

It will be understood that no glue is used when assembling. The rails, etc., are tenoned, and all fitting is done with paint, care being taken that no bare wood is left at the joints. Additional strength is obtained by pegging the joints with hardwood dowel rod, this applying to the seat rails (C, E and F) and the top back rail (H).

The cutting list will be as follows. In every case the lengths given allow for tenons and fitting, but the thicknesses are the net sizes when planed. Thus, if unplaned wood is obtained, allowance must be made for finishing.

	Long ft.	Long in.	Wide in.	Thick in.
(A) 2 Front legs ...	2	0	2¾	2¼
(B) 2 Back legs* ...	3	0	4¼	2¼
(C) 2 Seat rails	2	0	4	1¼
(D) 2 Arms	2	3	4	2¼
(E) Front rail ...	4	6	4	1¼
(F) Back rail	4	6	7	1¼
(G) Cross rail	2	0	4	1¼
(H) Top rail†	5	0	3	1¼
(J) 8 Splats	1	6	2	⅞
(K) Middle splat .	1	6	3½	⅞
(L) 7 Seat laths ...	4	6	2¾	1⅛

The diagrams explain the construction and only a few comments are necessary. Note that the legs are not square in section, but show 2¼in. on face and 2¾in. in side elevation. The back leg, whilst kept 2¼in. thick throughout, tapers in side elevation from 2¾in. at ground to 2in. at top. The rake of back leg as shown at Fig. 3 is 2in., but if the legs are kept straight the rake will have to be 3¼in. It is a wise plan to set out the end elevation (Fig. 3) full size in order that the angles of back leg, seat rail (C) and arms (D) may be marked correctly.

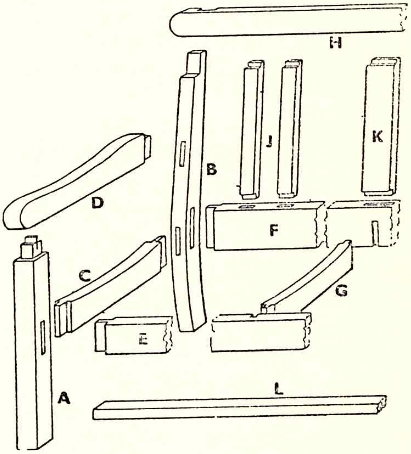


FIG. 4. DETAILS OF CONSTRUCTION.

Construction.—working to the thicknesses given, the legs and rails are marked for their respective mortises and tenons. The 4in. end seat rails (C) curve to 3in. If a deeper curve is preferred the width of rail will have to be increased. In setting out the back legs (B), note that the wide lower rail (F) is centred in the width, whereas the top rail (H) finishes flush on face. The central seat rail (G) is

*The width of 4¼in. given for the back legs allows for the curve; thus the two legs could be cut from a board 6½in. wide. If preferred, the splay may be omitted, in which case stuff 2¾in. by 2¼in. may be taken as for the front legs.

†If the little curved projection is to be left in the solid, the width of top back rail must be 4in. Alternatively, the part may be cut separately and pinned on, or it may be omitted.

dovetailed to the front and back rails. As already indicated, the rails are tenoned.

The two arms may be cut from a board 7in. wide and later shaped as shown. The sharp corners will, of course, be well rounded for comfort. The arms are tenoned and pinned to the back legs. To the front legs they are also tenoned, in this case with a foxwedge (see Fig. 4).

After a trial fit (dry) the two ends are completed and tested by laying both together. The front and back seat rails (E and F) are then assembled and the cross rail (G) added.

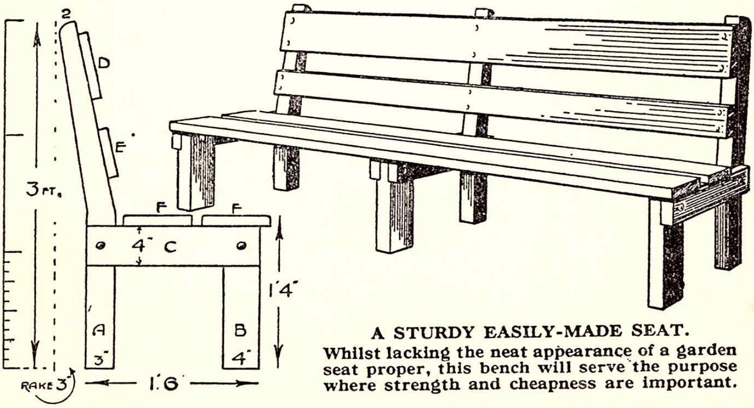
When the back is ready for completion, fit the splats (J and K) to the back rail (in which mortises will have already been cut to receive them), then slip on the top rail (H, which is halved to the back leg), housing the splats to it at the same time. The top rail (H) may be pinned, or alternatively, screwed with brass screws.

The seat laths (L) are allowed $1\frac{1}{8}$in. thick for lasting wear, although this in hardwood might be reduced to $\frac{7}{8}$in. The front lath should overhang the rail and be rounded. The sharp edges of all the other laths should be rounded off. The rear lath is bevelled to butt against the back seat rail as seen in Fig. 3.

Easily-Made Garden Seat

HERE is a very simply made type of garden seat which can be constructed of any odd pieces of timber you have, and painted green or chocolate with some paint which stands up well to the weather such as Bergers. It is strong and sturdy and will stand up to many years of hard usage. If it is going to be left outside indefinitely, the legs should be kept tarred. If you want to make it a fixture, the legs should be cut a foot longer and let well into the ground.

Benches of this kind are usually made from 6ft. to 8ft. long, and the scale and view shown will give you all the information you need. Apart from the lapping of the seat rails to the legs there are no joints to cut. The parts required for a 6ft. bench are these:



A STURDY EASILY-MADE SEAT.
Whilst lacking the neat appearance of a garden seat proper, this bench will serve the purpose where strength and cheapness are important.

	Long ft.	ins.	Wide ins.	Thick ins.
(A) 3 Back legs	3	0	5	2
(B) 3 Front legs	1	3	4	2
(C) 4 Seat rails	1	6	4	1¼
(D) 1 Back rail	6	0	7	1⅛
(E) 1 Back rail	6	0	5	1⅛
(F) 2 Seat boards	6	0	7	1⅛

Note that the finished width of the back legs (A) is 3in., but on account of the rake a width of 5in. is necessary. The three legs could be cut from one width of 12in.

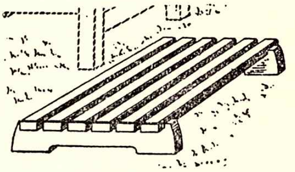
With regard to thickness, if the timber for legs and seat rails is stouter, do not plane it down; the extra strength is an advantage. In the same way the seat boards may be of 1¼in. stuff if preferred. If, however, 1¼in. is used for the back rails it is well to let them ⅜in. into the legs.

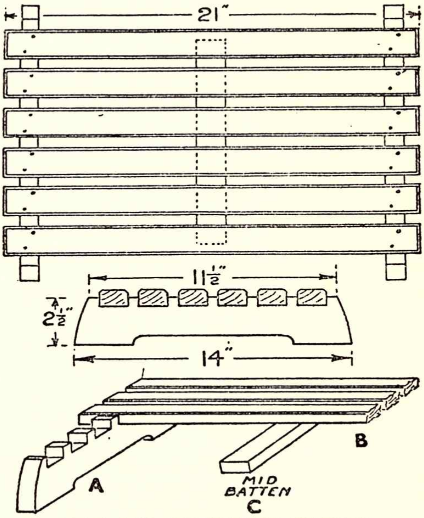
In construction see that all three back legs are exactly alike. The legs are cut in ¼in. for the seat rails as indicated and are secured by bolting. Two cross rails are shown for the centre legs, but one rail is adequate for a 6ft. bench.

The back rails and seat rails should be screwed with big screws of 1½in. to 2in., let well into the wood and thoroughly well puttied over. For about eighteenpence you can buy a special countersink bit which will allow you to let the screws well into the wood.

Foot Mat For Seat

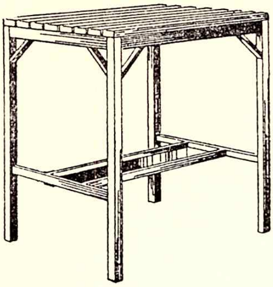
A WOODEN foot mat is a very handy thing to have in connection with garden furniture, so we are showing an illustration which is practically self-explanatory, of a foot mat for a garden chair. Instead of making it 21in. long, you would want it 4ft. 6in. or whatever length you had made your garden seat, and possibly you would put two battens underneath instead of one. The slats overhang the ends by ¾in., and the slats are screwed into the feet with spaces of ½in. or ¾in. between them.





PLAN AND DETAILS OF FITTING.

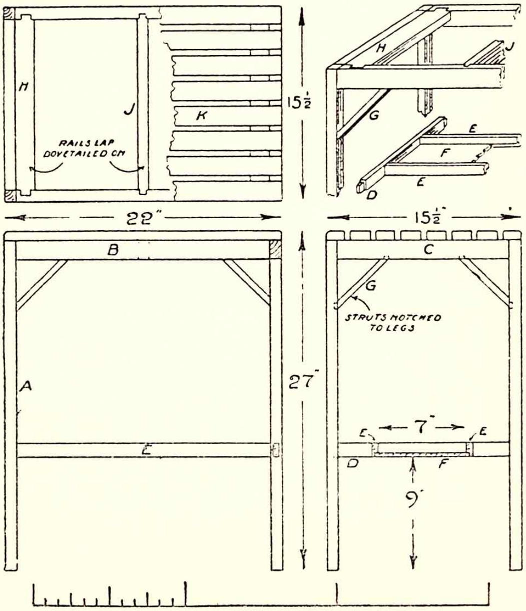
A Useful Garden Table



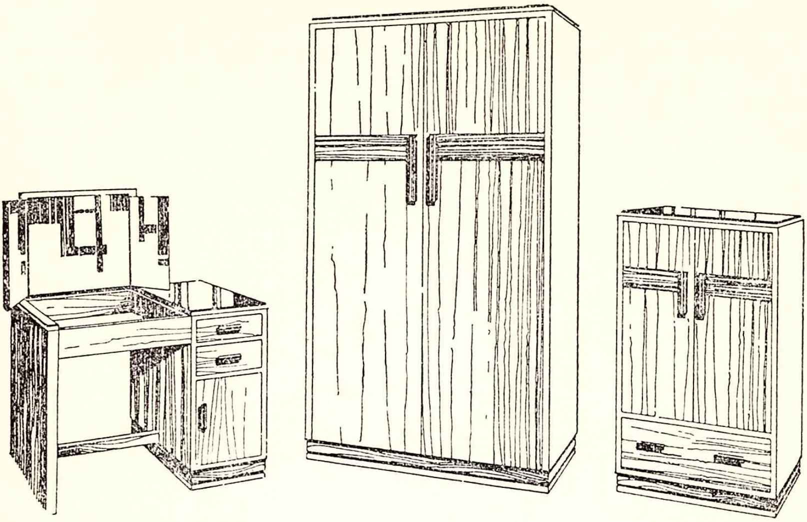
THE light garden table illustrated here is very simple to make, and it is reasonably strong. The top rails and end underframing rails are tenoned to the legs (or they could be screwed). The stretchers (E) are tenoned to the end rails (D) and rebated for the tray bottom (F). If desired, the bottom (F) may simply be screwed to the underside of the rails. The stiffening top rails (H) are lap-dovetailed to the rails (B), a centre rail (J) being dovetail-notched in. The slats (K) may be screwed on with brass screws, the holes being well counter-sunk. If preferred, they may be screwed from below, through rails (H). Made in hardwood, this would last indefinitely. It could be made of heart rimu or of oak.

Materials required for the garden table are as follows, the sizes allowing for joints and fitting, but otherwise being net:

	Long		Wide	Thick
	ft.	ins.	ins.	ins.
(A) 4 Legs	2	2¼	1	1
(B) 2 Rails	1	10	1½	1
(C) 2 Rails	1	3½	1½	1
(D) 2 Rails	1	3½	1¼	½
(E) 2 Rails	1	10	1¼	½
(F) Tray bottom .	1	9½	8	¼Ply
(G) 8 Struts ..		6¼	1	½
(H) 2 Top Rails..	1	3	1½	¾
(J) Cross Rail ..	1	3	1½	¾
(K) 8 Top Slats ..	2	2	1½	¾



Scale Diagrams of Table.



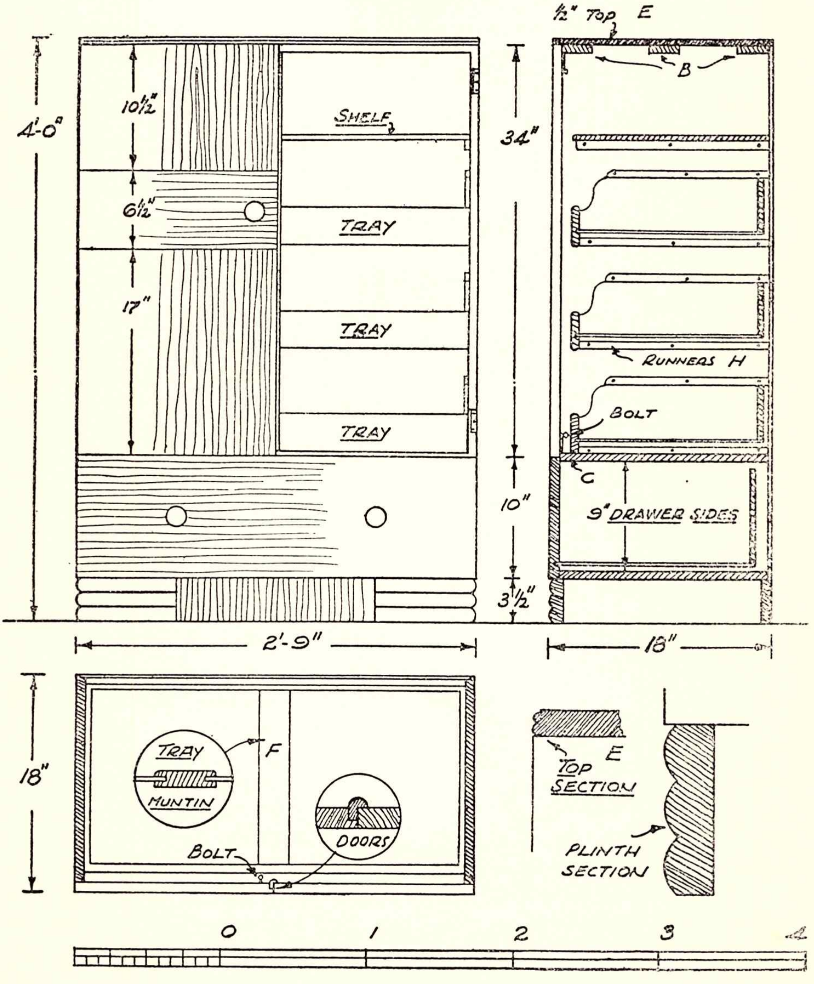
Making Bedroom Furniture

THE needs of families and individuals differ so greatly that it is difficult to lay down hard and fast plans for bedroom furniture, and the styles in which it is finished will necessarily depend on the bedroom for which it is made. Simplicity in design and finish is the keynote of modern furniture, and where there are the necessary spaces, the ideal is to build the furniture into recesses. Oak stained light, with a high-quality stain such such as Taubman's or Berger's light, with a high-quality stain always looks very effective, while oiled and stained heart of rimu, especially if you have had the opportunity of selecting wood with a nice grain, is always attractive. On the other hand if you have a colour scheme in your room, you can finish your furniture in a contrasting colour, or in tones that harmonise, with a high quality glossy paint such as Taubman's Dynamel which dries with a very hard glossy surface that lasts for many years.

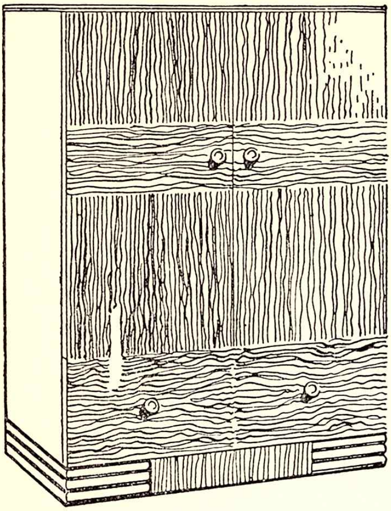
With the idea of helping you solve the problem of what to make, and what size to make it, we are giving detailed plans of a modern tallboy 4ft. high by 2ft. 9in. wide, showing the ideal method of making it from the cabinetmaker's viewpoint. At the same time, as we have pointed out elsewhere, you can think out many adaptations to simplify the work, without reducing its quality very much, and this applies particularly where you are building it in, and where you have the strength and stability of existing walls to rely on. In any case, glueing and screwing in combination will give you a very strong job, and provided you countersink the screws and putty the holes neatly, they will never be noticed. Moreover the drawer construction can be greatly simplified by making them as square and solidly built boxes without lids—which is in reality all that drawers are. If you will get out of your mind that the method given is the one and only way of doing the job, and get into it that it is merely the *ideal* and that the main purpose of the plan is to make suggestions to you, the job will be made much more easy.

Making The Wardrobe.

BEFORE going into details on the tallboy for instance, let us have a very brief look at the diagram of the dressing table, tallboy and wardrobe. Take the wardrobe for a start and let's suppose that you want one 6ft. high, about 3ft. wide and 1ft. 6in. deep. Obviously your best plan would be to work your two sides with 9in. timber, glueing two pieces together to give you your 18in. depth. You would make a base about 4in. high on which the wardrobe would be mounted, and you would make the back from three ply or hardboard,


½" Top E
B
4'-0"
10½"
6½"
17"
SHELF
TRAY
TRAY
TRAY
34"
RUNNERS H
BOLT
C
10"
9" DRAWER SIDES
3½"
2'-9"
18"
18"
TRAY
MUNTIN
F
DOORS
BOLT
E
TOP SECTION
PLINTH SECTION
0
1
2
3
4

Scale front elevation, sectional end view and plan of tallboy (trays shown), also detail of plinth (Fig. 2).



Tallboy, height 4ft., width 2ft. 9ins.

or light timber. Then you would have only the doors to consider and these could be made of $\frac{3}{4}$in. plywood if obtainable, or if the wardrobe were to be painted, of a frame to which was attached a piece of solid hardboard. The whole thing could be put together quickly and easily on a system of glueing and screwing, and the same applies to the tallboy. How you would fit up the interiors, and the exact measurements you would make them, would depend on who was going to use them. If you think it's too difficult to decide for yourself the exact sizes to make them, have a look at some similar pieces in a friend's house, measure them, decide what differences in size are needed in your own case, and then go home and plan the job after studying these diagrams again. You will find, if you do this, that the job has simplified itself enormously.

Detailed Tallboy Plans.

THREE alternative treatments for the interior of this modern tallboy are offered. First, in Fig. 2, are shown sliding trays. In Fig. 3 is indicated the arrangement for bachelor's use—part hanging and part shelves; in this case 6in. or more could with advantage be added to the height. Then at Fig. 4 is shown the all-shelf fitting, the shelves resting in adjustable fillets.

Carcase.—The general construction is shown in Fig. 5. The ends (A) are $\frac{3}{4}$in. thick and any joints should be dowelled or tongued. Trench across the ends $\frac{1}{4}$in. deep for the cupboard bottom (C), stopping the grooves near the front edge. The bottom (D), which is less in width than the ends by the back thickness, is lap-dovetailed to the ends. The three top rails (B) are the same length as the bottom (D) and are dovetailed down to the ends.

On assembly the carcase should be tested for squareness, corner to corner diagonally each way. If the carcase back (G) has been prepared ready for insertion, this will act as a good check if screwed in place. When ready, true up all the front edges for the fitting of the doors and drawer.

The top is the same over all size as the carcase, plus the door thickness, and the front and ends are beaded to the section given in Fig. 2. The top is fixed by screwing up through the top rails (B).

Doors.—These should be $\frac{3}{4}$in. thick plywood or hardboard, clamped on the hinged edges and faced along the top edges and down the meeting edges. The meeting edges are trued up first with a good closing joint, afterwards trimming up the outside edges to the carcase width.

It would be better to leave the trimming of the top and bottom edges until after the doors are hinged to the carcase end. The top can be planed off on the job, but the doors will require removing to true the bottom edges after striking the line. Allow a ¼in. lap over the cupboard bottom (see C, Fig. 2). A pair of 2in. butt hinges are required to each door, a pair of bolts for the left-hand door, and a bullet catch or press latch for the other.

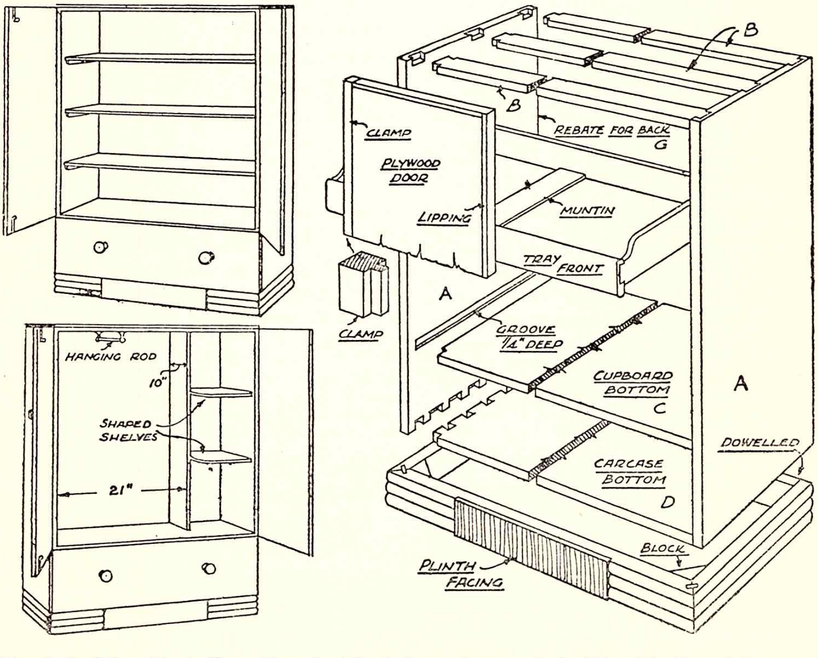
Drawer.—The front should be plywood the same thickness as the doors. The sides are slip-dovetailed to the fronts and through-dovetailed to the backs.

A centre muntin (F) is necessary, similar to that shown for the trays at plan (Fig. 2). Groove the muntin on two edges for the bottoms tongue it to the front and screw to the back. Grooved slips are glued and pinned to the sides and the bottom run in.

Plinth.—This is the same over all size as the carcase, plus the drawer front thickness. It is mitred, tongued and blocked at the front corners and butted and dowelled at the rear (Fig. 5). The front is pared away for the cross-banded facing. The plinth is fixed by screwing down through the carcase bottom.

Trays.—These are alike and there will be room for four. (Three are shown with a top shelf at Fig 2.) The fronts have rounded top and bottom edges. When striking off the lengths of the fronts and backs from the completed carcase allow slightly on the full side for subsequent easing of the tray sides.

The trays should fit smoothly but not loosely. The sides are lap-dovetailed to the fronts, allowing a step down of the fronts in order to cloak the runners (H, Fig. 2). The sides are through-dovetailed to


HANGING ROD
10"
SHAPED SHELVES
21"
B
B
CLAMP
PLYWOOD DOOR
LIPPING
REBATE FOR BACK G
MUNTIN
TRAY FRONT
A
CLAMP
GROOVE ¼" DEEP
CUPBOARD BOTTOM C
A
DOWELLED
CARCASE BOTTOM D
BLOCK
PLINTH FACING

Top left (Fig. 4), tallboy fitted with shelves; bottom left (Fig. 3), fitted for man's use. Right (Fig. 5), construction details of tallboy, showing carcase.

the backs. Muntins and slips are fitted as for the drawer.

When fitting the trays keep the fronts clear of the rear surface of the doors by about 1 inch to allow for the bottom bolt on the left-hand door (see Fig. 2).

Here is a complete list of the parts you will need for the tallboy if you make it the way suggested above, and the same size:—

		Long		Wide	Thick
		ft.	ins.	ins.	ins.
	1 Plinth front ..	2	9	3½	1⅛
	2 Plinth ends ..	1	6	3½	1⅛
	1 Plinth back ..	2	6¾	3½	⅞
	1 Plinth facing ..		3½	16½	½
	2 Doors	2	10	16½	¾
	1 Drawer front ..	2	9	10	¾
A	2 Ends	3	8	17¼	¾
B	3 Top rails	2	8½	2½	¾
C	1 Cupboard bottom	2	8	17	⅝
D	1 Carcase bottom	2	8½	17	⅝
E	1 Top	2	9	18	½
F	1 Drawer muntin	1	4½	2½	⅝
	2 Drawer sides ..	1	4½	9	⅜
	1 Drawer back ..	2	7½	8	⅜
	2 Drawer bottoms	1	2⅜	16½	¼
G	1 Carcase back ..	3	8	32½	¼
Interior with Trays (Fig. 2).					
	3 Tray fronts ..	2	7½	3	⅝
F	3 Tray muntins ..	1	3½	2½	⅝
G	1 Shelf	2	7½	16	7-16
	2 Bearers	1	3½	⅝	⅜
	6 Tray sides ..	1	3½	5	⅜
	3 Tray backs ..	2	7½	4¼	⅜
H	6 Tray runners ..	1	3½	⅝	⅜
J	6 Tray kickers ..	1	1½	⅝	⅜
	6 Tray bottoms ..	1	2⅜	15½	¼
Alternative Hanging Interior (Fig. 3).					
	1 Division	2	10	10	½
	2 Shelves		10½	16	7-16
Interior With Shelves (Fig. 4).					
	3 Shelves	2	7½	16	7-16
	6 Bearers	1	3½	⅝	⅜

Note that all thicknesses are net.

As we mentioned earlier, the system given above is the *ideal* way of making the tallboy, but you can from the diagrams very quickly work out easier methods. The same applies to the wardrobe and dressing table, illustrations of which appear here which can be either built along the lines given above, or by simpler and quicker methods. Useful sizes of these would be, dressing table, 2ft. 9in. by 1ft. 8in., and the wardrobe 3ft. wide and 5ft. 10in. high.

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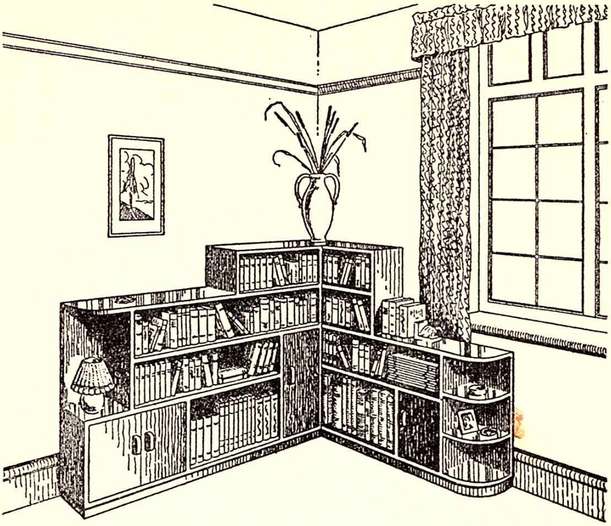


Beautiful Corner Bookshelves

TO anyone who is unaccustomed to using tools the diagrams illustrating this very fine set of bookshelves may look a little awe-inspiring, but if you study them closely you will see that all that is really needed is some careful planning. When made up, these bookshelves look delightful; the writer has made them exactly as described here, but the work could be greatly simplified if desired by eliminating many of the grooves, and using screws in their place. The writer's shelves are made of oak, light stained, and this makes a very fine job—though more expensive than when rimu is used. Some idea of the amount that can be saved by making these yourself can be gained from knowing that to buy them in polished rimu costs about £11 whereas the materials for making them in rimu cost only a little over £2 and in oak something over £3. There's a further point worth mentioning. The effect of this bookcase is gained from the shelves for ornaments, etc., and by breaking-up by cupboards and the semi-circular finish. Admittedly it takes a fairly large room to carry a bookcase as large as this, but if you study the diagrams carefully you could, with a little trouble, modify the plan to suit your own requirements. Always remember that it is advisable to draw up a diagram, to scale, so that you can see what the general effect of your design will be.

In these days of plain-coloured living-room walls, books give a delightful touch of colour, and when displayed in a bookcase of this type, they give the room that "lived-in" look that sets off everything else to advantage. The design illustrated is for the long type of room which allows for a long side of 5ft., whilst the short side projects, for preference, under an adjacent window. The staggering of the shelves effects a nice balance between the length and height of the pieces.

The long side of the arrangement (Fig. 1) is fitted with two cupboards, and a feature of the shelves is the method of terminating them. The long side has an open recess, which is ideal for an ornament in bright colours, and if oak is used, it makes a perfect background. The short side terminates in three small shelves, all rounded, which are useful for ash trays and other small articles.

The shelves may be constructed of either oak or rimu, though the former is preferable, and it may be light or dark stained or simply well polished in the original colour. The backs and the shelves are of ½in. timber, but all the rest finishes ¾in. thick.

As regards construction, Figs. 3 and 4 illustrate the only points requiring explanation. Concerning Figs. 1 and 3, the ½in. back is in two pieces, the one being grooved in pieces A, G, H and L, the other in E. G. L and M, the grooves being ¼in. deep and ¼in. from the rear edges. The large piece should be screwed from the back to pieces D, F, J and K. Note that the ¼in. transverse groove in A (Fig. 3) brings the cupboard shelf flush with the back, and that the groove for piece J is ¼in. deep for the same reason.

In fitting up, the inner shelves should first be assembled on the base, the back placed in the groove in the base some 6in. to the right of its final position, and L fitted. Piece A may then be fitted from behind, B being nailed to it and the nail holes filled. The back may then be pushed up into the groove in A, A screwed to C, and G fitted (not forgetting the shelves in the tall cupboard). Pieces E and M and the small back are fitted last.

Assembly of the short side follows the same procedure, the back again being in two pieces (above and below piece H). Shelves L and M (Fig. 2) are stop-grooved into pieces A and E to a depth of ¼in.

Doors may be solid stuff, or oak-faced plywood, ¾in. thick, with lipped edges. Ball catches should be fitted. Handles may be oak (as shown) or in chromium.

The plinths are set back ¼in.; consequently the front edge of long plinth projects ¼in. beyond the right-hand end of the shelves (Fig. 1). The dotted lines in this diagram indicate the position of the cross stays.

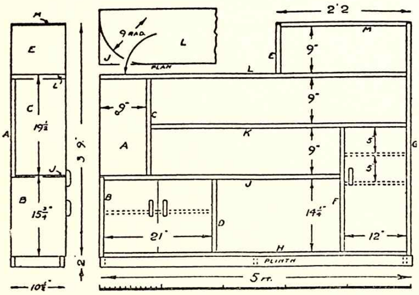


Fig. 1. End view and elevation of long side.

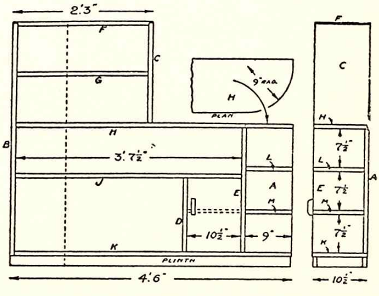


Fig. 2. Elevation and end view of short side.

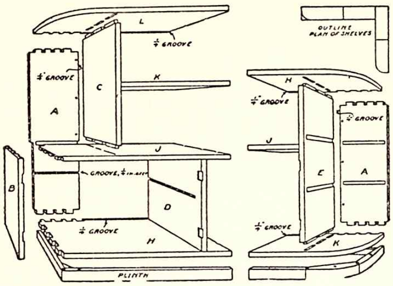


Fig. 3. Long side (left hand end), at left. Fig. 4. (at right) short side.

Except where otherwise shown, the joints used are mortise and tenon. Figs. 4 and 5 illustrate the construction of the short plinth, the front edge of which is built up of three pieces. After assembly the plinths are screwed to underside of shelves.

CUTTING LIST.

Net lengths are given ,including tenons and dovetails which in all cases are ½in. long.

(1) To finish 10in. wide, ¾in. thick, except where otherwise stated.

Long Side.	Long. ft.	in.	Wide. in.	Short Side.	Long. ft.	in.	Wide. in.
A	2	11	9¾	A	2	1¼	9¾
C	1	7¾	9¾	D	1	3¼	
D	1	3¼		E	2	1	9¾
F	2	1		G	2	2½	
J	3	11		J	3	8½	
K	4	2½		L		9¼	
				M		9¼	

(2) To finish 10½in. wide, ¾in. thick.

Long Side.	Long. ft.	in.	Short Side.	Long. ft.	in.
B	1	3½	B	3	8¾
E		10	C	1	7¾
G	3	8¾	F	2	3
H	4	11½	H	4	5¾
L	4	11¾	K	4	5¾
M	2	2			

(3)	Long ft.	in.	Wide in.	Thick in.
1 Shelf	1	9½	9	½
2 Shelves	1	0½	9	½
1 Shelf		11	9	½

(4)	Long		Wide	Thick
2 Doors	1	2¼	10½	¾
1 Door	2	0	12	¾
1 Door	1	2¼	10½	¾

(5) Backs (oak-faced plywood).

1 Piece	4	2	34¼	¼
1 Piece	2	1	9½	¼
1 Piece	3	8	24½	¼
1 Piece	2	2	19¼	¼

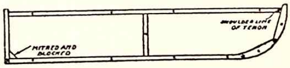


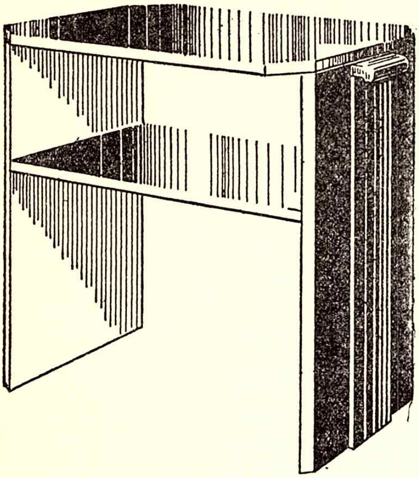
Fig. 5. Plan of short plinth showing method of rounding end (Screw holes sunk to a depth of 1in.).

(6) Plinth.

2 Pieces	5	0	2	¾
2 Pieces		10¼	2	¾
1 Piece (Cross rail)		9¼	2	¾
1 Piece	4	5¼	2	¾
1 Piece		10¼	2	¾
1 Piece (cross rail)		9¼	2	¾
1 Piece	3	9	2	¾
2 Pieces (rounded end)		8	2	1½

THE reason why a drawer becomes difficult to open and close is usually either that it is too big for its recess or, paradoxically, because it is too small for it. In the former case, a very slight search will reveal the rubbed part of the drawer which shows where the fit is too tight. Often all that is required is an application of blacklead: or sandpaper will quickly put matters right. If a drawer sticks only when nearly closed or just slightly opened it will probably be found that the front panel is the defaulting part, in which case sandpaper should be rubbed along the *lower* edge, or at the sides.

A Light Occasional Table



THE table illustrated here is a very useful type, which is easily made, even by an amateur carpenter with little experience. The method outlined here of combined glued and screwed work is far and away the best because it gives a strength that can be obtained in no other way, but if you have no glue, it would be possible to construct it with screws only, concealing these as far as possible by working from the inside, but puttying them up where they had to go outside.

Oak of ¾in. finish, or rimu of 1in. finish will make a satisfactory table, and where you wish to paint it to work in with the colour scheme of a room, rimu is of course to be preferred, being much cheaper. The best plan is to set out the top (E) to a size of 20in. by 13in., marking off 2in. each way at the corners to obtain the cant. In this way the correct bevel of the edges of legs is secured, the legs finishing flush with the top (see plan, Fig. 1).

The legs (A, Fig. 2) are bevelled on their upright edges as indicated. They are dovetail-notched to take the two top rails (B), trenched for a tongue on the shelf (C) and slotted to take the handles (D).

In assembling, glue in the shelf and the two top rails. Test for squareness and cramp up. Later, glued blocks (X) are fitted under the shelf and screwed. Let these blocks stand in 1in. or 1½in. from edges of shelf.

The handles (D) are shaped from pieces about 3½in. square by ⅞in. thick. Work fingerholds as shown and glue and screw in position, with glued blocks (X) underneath. The handles need not project more than 1¼in. beyond the ends.

The top is screwed from below through the rails and handles, and the end slabs (F) are glued on and

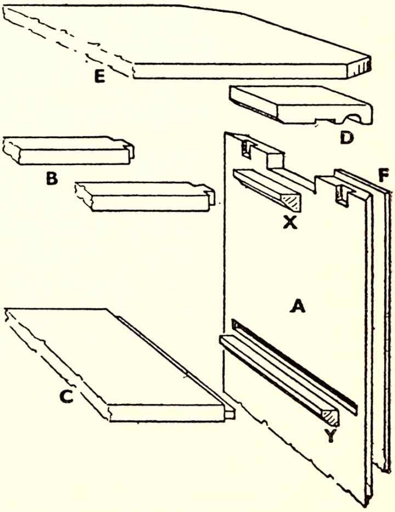


Fig. 2. Details of construction.

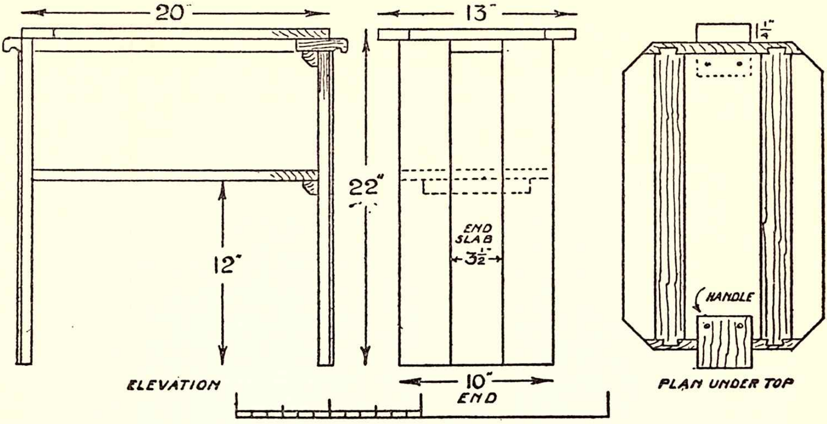


Fig. 1. Front and end elevations, plan and scale.

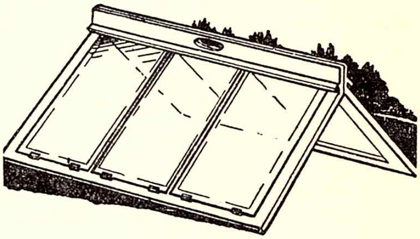
panel-pinned. The few parts needed are these:

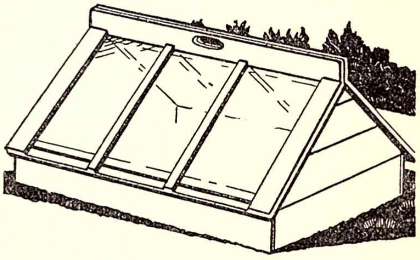
	Long		Wide	Thick
	ft.	in.	in.	in.
(A) 2 legs	1	9½	10	$\frac{5}{8}$
(B) 2 rails	1	8	2	$\frac{7}{8}$
(C) Shelf	1	8	10	$\frac{5}{8}$
(D) For 2 handles		7	3½	$\frac{7}{8}$
(E) Top	1	8	13	$\frac{5}{8}$
(F) 2 slabs	1	9	3½	$\frac{1}{4}$

Lengths allow for joints and fitting, but all thicknesses are net.

Miniature Garden Glasshouse

FOR those who want to grow plants from seed, to produce early lettuces, or to try and grow seedlings which are sensitive to cold weather conditions, a miniature glasshouse, popularly known as a garden light, is almost essential. If you buy them, they are expensive, but you can make them easily in many different sizes and styles to suit any odd pieces of glass you may have on hand. A useful size is to make the movable top 4ft. long by 1ft. 9in. wide, to fit over a bottom frame, 3ft. 10in. by 2ft. 4in. The joints can be glued and tenoned if desired, but a good job can be made with screws, letting them into the wood with a countersink bit, and puttying up the places where they go in. The advantage of this type of miniature glasshouse is that the top can be easily lifted off on fine sunny days, while it gives really good protection during cold, wet weather.

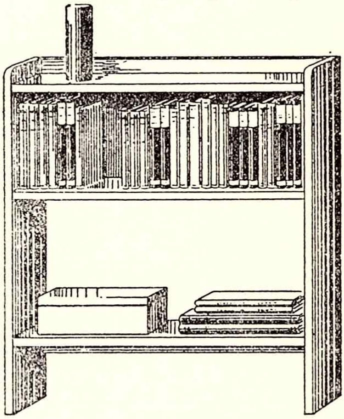




How To Make Bookshelves

NOTHING looks more attractive in a living-room than well-filled bookshelves and at one time or another, practically every householder needs some type of bookshelf. Naturally their style is legion, and the type selected will depend largely upon the style of the house itself. We are giving details of several different types, and from those given, and the sizes, it will be possible for you to make up practically any type you want. Bookshelves are among the easiest of jobs for amateurs to make, whether they be built-in, or not. Those who are doubtful about their ability to cut out the boards can actually buy them ready-cut to the actual lengths desired, at some extra cost. The built-in bookshelves dealt with elsewhere are a little more elaborate than the ones shown in this section, but provided the diagrams are carefully studied they are not difficult to make. The mistakes that amateur cabinet - makers most commonly make are to rush enthusiastically into a job without first carefully planning it. Once again, therefore, we urge you to decide exactly what you want, then study the appropriate plan carefully before commencing the job of cutting out your timber. If none of those shown fit exactly into the scheme of your room, work out from the one that is nearest, a plan which will suit, and be sure and draw it out on paper before ordering your timber. It is easiest from your point of view to stick to the thicknesses of timber given here, but an equally good bookcase can be made in timber slightly thicker.

Probably the best all-round timber for bookshelves, where they are going to be stained or polished, or where they are going to be finished in the modern self-coloured style (bare wood finished with a clear varnish) is oak. It is a heavy, strong timber which works well, and the grain of which stands out beautifully under treatment. Some of the Australian hardwoods such as jarrah, where obtainable, work up beautifully, too, but the timber which will naturally be most widely used today, being cheapest, and good, is rimu. If the shelves are going to be stained, or oiled and polished, you would want good heart rimu, if they are going to be painted, O.B. rimu would be quite good enough. Very often, when you want only a small quantity of timber for something like a bookshelf, a timber merchant, for a small additional charge, will pick you out a particularly nice-grained piece which will make all the difference to the final appearance of your job. If you intend painting the shelves, use a really good quality paint with a glossy hard finish, such as Taubman's "Dynamel." The difference in cost between the very best materials, and ordinary paint, in bookshelves will usually be only a matter of pence, but there is a vast difference in the final article.



A bookshelf table.

A Bookshelf Table (Fig. 1)

THIS piece, serviceable as a side table, offers a single bookshelf and a lower shelf for sundries. Referring to Fig 5, the parts required are these:

		Long		Wide	Thick
		ft.	in.	in.	in.
(A)	2 Ends	2	6	7½	¾
(B)	Top shelf ...	2	2½	7¼	¾
(C)	Bottom shelf	2	2½	7½	¾
(D)	Lower back rail	2	2¾	2	¾
(E)	Book shelf ..	2	2½	7¼	¾
(F)	Back (ply) .	2	2¾	10	¼
(G)	Upper back rail	2	2¾	1½	½

The top and bottom shelves (B and C) should be dovetail-housed to the ends, the book shelf (E) being plain-housed. See that the joints are stopped ½in. from front edge (see detail diagram at Fig. 5).

The lower back rail (D), on which the bottom shelf (C) rests, is lap-dovetailed to the ends, as at X. The ½in. top rail (G) may be rebated on. The ends are rebated for the plywood back (F) which goes behind the two upper shelves, to which it will be screwed or pinned. If thought necessary, glued blocks (Y) may be fitted under the bottom shelf as indicated. Cut these short about 1in. from front edge.

Hanging Bookshelf (Fig. 2)

ON account of the weight of books this item is kept to a small size. The width might be increased slightly if due care is taken with the wall fixing. The parts required for a piece of the dimensions given (see Fig. 6) are:

	Long		Wide	Thick
	ft.	in.	in.	in.
2 Ends	1	10	5½	⅝
3 Shelves	1	2½	5¼	⅝
Back (ply)	1	10	15	¼

The practice here again is to dovetail-house the top and bottom shelves. Preferably, too, the ends should be rebated for the back, but of course less work is entailed by fixing the plywood on over all. Use rawplugs for hanging the piece to the wall, if it is plastered, or screw in where it is a wooden wall. Special small bookcase hangers can be obtained from a hardware store if desired.

Light Standing Bookshelves (Fig. 3)

FOR this piece, taking the details at Fig. 8, the parts are these:

		Long		Wide	Thick
		ft.	in.	in.	in.
(A)	2 Ends ...	2	10	7	⅝
(B & C)	4 Shelves	1	2½	7	⅝
(D & E)	4 Rails .	1	2¾	2¼	½

It will be wise in this case to dovetail-house all four shelves to the ends. If, however, the rails (D and E) are dovetailed on behind, the two middle shelves may be plain-housed, provided that dovetail housing is adopted for the top and bottom shelves (B).

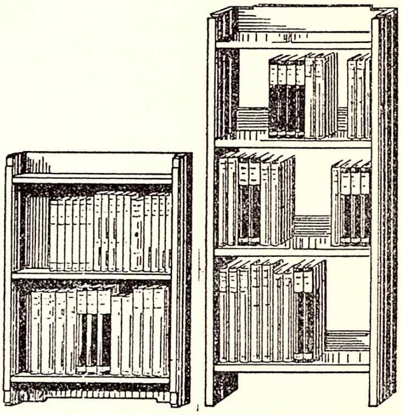


Fig. 2 (left): Hanging bookshelf.
Fig. 3 (right): Standing bookshelves.

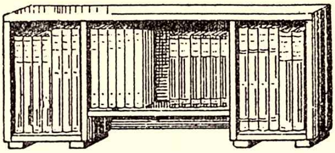
The spacing of the shelves allows for large as well as small 8vo. volumes.

Table Bookstand (Fig. 4)

BOOKSHELVES of this type are often fitted with ear plates for hanging. The design may, if preferred, be used in this way, but toes are added so that the item may stand on a side table or chest of drawers. Scale elevation and details are given in Fig. 7.

	Long ft.	Long in.	Wide in.	Thick in.
(A) 2 Outer ends		11	7	½
(B) 2 Inner ends		10¾	6¾	½
(C) 2 Bottoms ..		7	6¾	½
(D) Top	2	3	7	½
(E) Centre bottom	1	1½	6¾	½
(F) Back (ply) .	2	3	11	¼
(G) 4 Toes		6½	1¼	¾

As indicated in Fig 7, the ends (A) are through-dovetailed to the bottoms and top (C and D). The inner ends (B) are also dovetailed to the bottoms (C) and housed to the top. In a simpler way, bottoms and top may be rebated on and screwed.



A table bookstand.

The middle bottom is housed to the inner ends and the plywood back pinned on. For the best work the outer ends and the top will be rebated for the ends; otherwise it may be fitted on over all. The toes, which stand in ¼in. each way, are screwed through the bottom.

ELEVATIONS WITH SIZES OF BOOKSHELVES

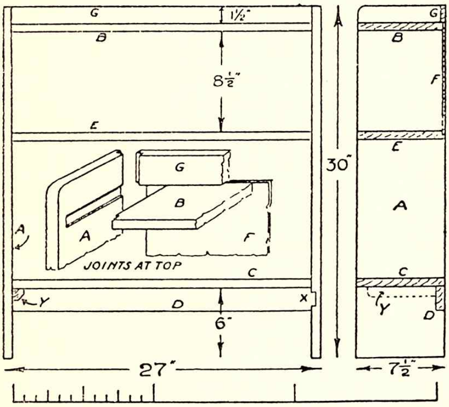

G
1½"
B
8½"
E
30"
G
B
A
A
F
JOINTS AT TOP
C
Y
D
X
6"
27"
G
B
F
E
A
C
Y
D
7½"

FIG. 5. ELEVATIONS OF BOOKSHELF TABLE.

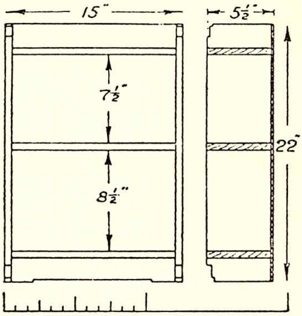

15"
5½"
7½"
8½"
22"

FIG. 6. DETAILS OF HANGING BOOKSHELVES.

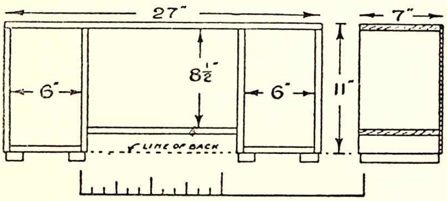

27"
7"
8½"
6"
6"
11"
LINE OF BACK

FIG. 7. TABLE BOOKSTAND DETAILS.

The sizes given on these drawings will prove suitable for general purposes, but they can be adapted to suit special requirements.

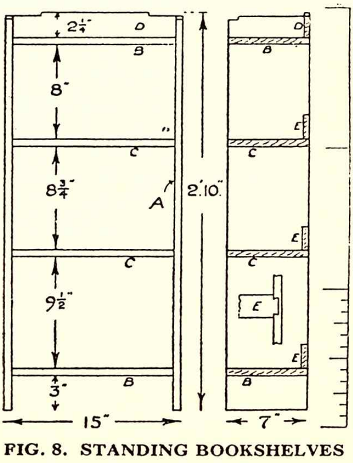
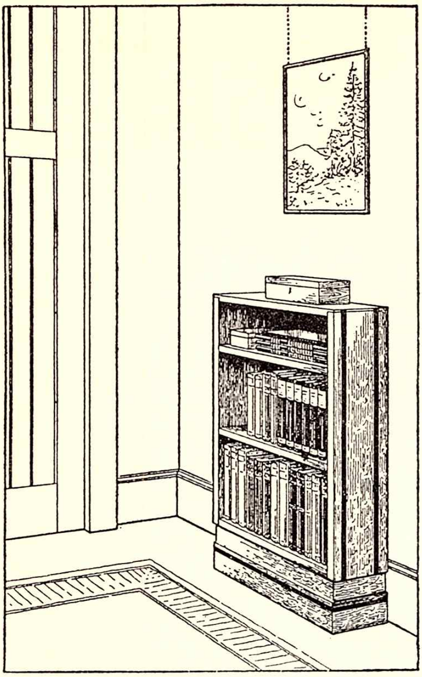

2¼"
D
B
8"
C
8¾"
A
2'10"
C
9½"
B
3"
15"
D
B
E
C
E
C
E
E
B
7"

FIG. 8. STANDING BOOKSHELVES



Bookshelves With Plinth (above)

HERE is another variation in bookcase style which, finished with the plinth at the bottom, makes a very neat job. The two bands shown can be inlaid if desired, and add an attractive touch. It can be made the size given here, or adapted to any desired size. There is no need to finish it with dovetail joints unless desired; it could be screwed together or screwed and glued.

The dovetail joints for bottom and top are shown in Fig. 10. Note that the top and bottom as well as the ends are rebated for the ⅜in. back, also that the housings for the shelves (D) are stopped about ¾in. from face.

The plinth parts (E and F) may be tongued together, or of course they could be dovetailed or mitred. The front and back are connected by rails (G) lap-dovetailed on. These facilitate screwing to the carcase. The overlaid thickening pieces (H) are mitred at the corners, glued on and panel-pinned. The main plinth (E, F) is recessed ½in. at front and ends, the overlays (H) being ¼in. thick.

Should any decoration be desired, two ½in. wide inlaid bands may be run down the ends as in Fig. 11. These stand in 1in. from edge. A similar ½in. band may be run round the ends and front of plinth (that is, on parts H); the band is kept ½in. from top edge of H.

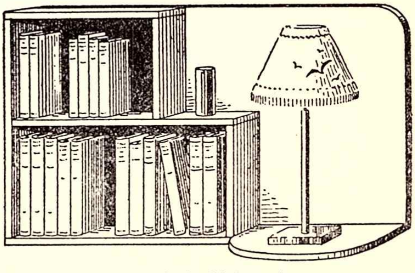
The parts required are these:—

		Long ft.	Long in.	Wide in.	Thick in.
(A)	2 Ends	1	10	6½	⅝
(B)	Bottom	1	5	6½	⅝
(C)	Top	1	5	6½	⅝
(D)	2 Shelves ...	1	4½	6¼	⅝
	Carcase back	1	10	17	⅜
(E)	2 Plinths ...	1	4	5	¾
(F)	2 Ditto		6	5	¾
(G)	2 Rails		5½	2	¾
(H)	Overlay ...	1	5	3	¼
	2 Ditto		6½	3	¼

All thicknesses are net.

Bookshelf Lamp Bracket (Fig. 12)

FINALLY we show a combined bedroom lamp-holder and bookshelf which can be erected in a suitable position. Detailed instructions are not given because the design is really self-explanatory. There is no need to have the rounded front unless desired, and the whole job



A bookshelf bracket.

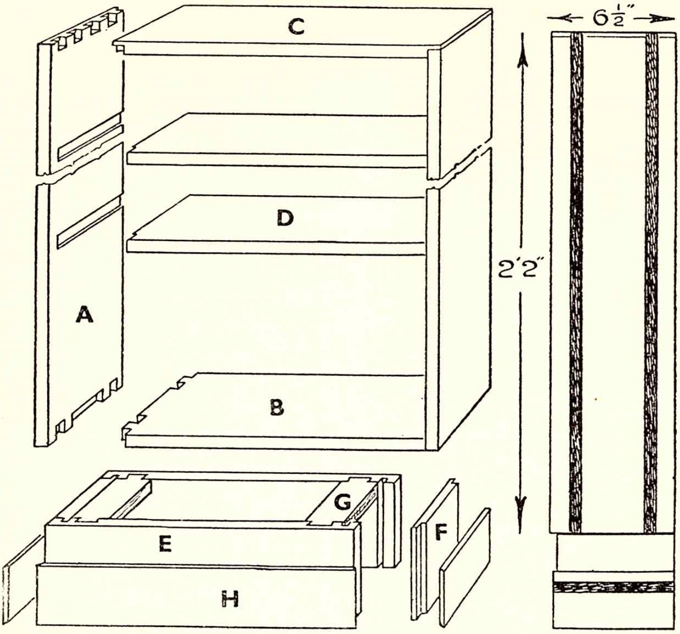
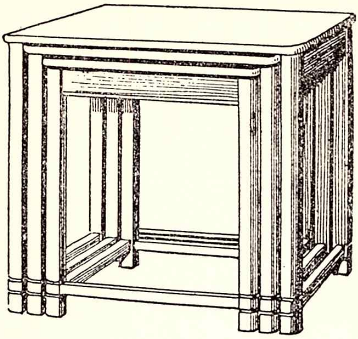


Fig. 10 (left): Construction of carcase; Fig. 11: End view.

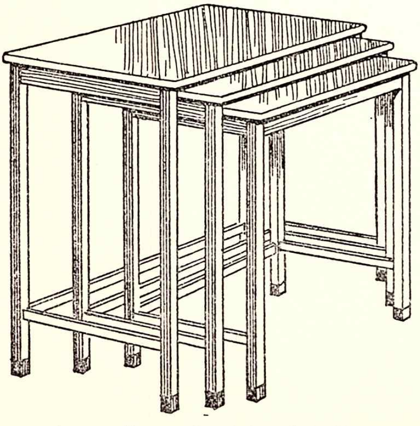
can be made in half-inch timber, or in thick plywood where this is obtainable. It can be screwed and glued together, or made with proper dovetail joints as shown in the case of the other bookcases. One very important point is that a lamp of the type shown is a perfect nuisance in a bedroom, unless it is on a very heavy base, or unless it is screwed to the shelf. It is bound to be knocked at some time, and if it is light the shade and globe will be broken. For that reason, see that you get a lamp that can be screwed down, or one that is very heavily based.

A Nest of Tables



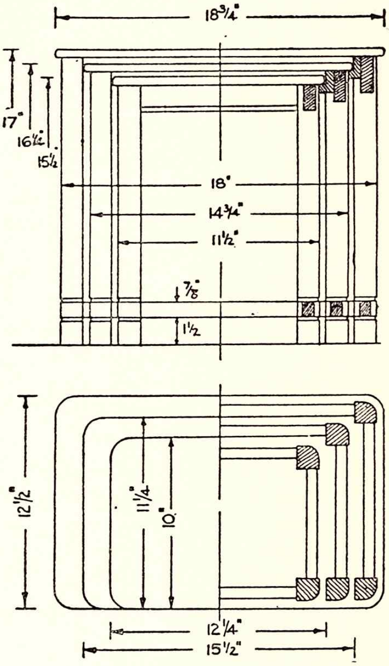
Modern design of table.

IF you have never had a nest of tables in your living room, you cannot perhaps realise how handy they are, but those who have them, would never be without them. They are useful for guests at afternoon tea, for doing a little writing on when sitting in easy chairs, for putting ash trays on, and for a hundred and one other uses where something light and easily moved is needed. We show two modern styles here, and give detailed plans for one; the other is equally easily made, and if you don't want to go to much trouble, you can adapt the plan and screw your tables together without worrying about rebating, etc. These tables look very nice in oak, or they can be made in heart rimu and stained and polished, or painted with a really good finish to tone with the furnishings or walls of the room.



An easily made style of table.

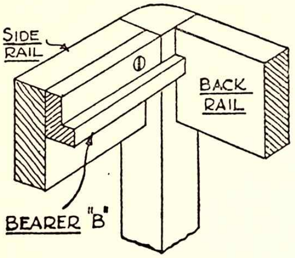
Twelve legs are required for the three tables in sets of four, each shorter set being $\frac{3}{4}$in. less in height than the one above. If the rounding of the outside corner is done by hand it would be advisable to make a template for working to ensure that all are alike. The small channels which decorate the base need not be carried all round the legs, but could be incised on the rounded face only.



Half front and sectional plans.

The smallest stool will have rails and stretchers all round, but the larger two tables will have rails and stretchers on three sides only.

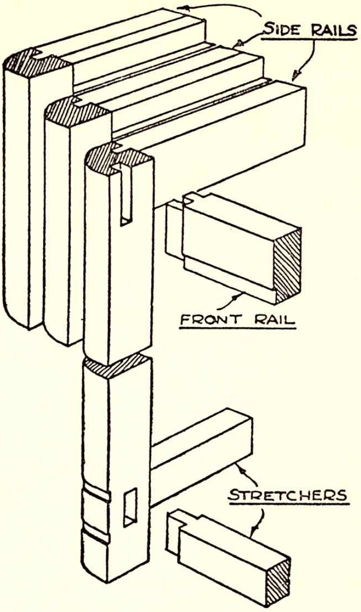
The tops pass between the legs, and rebated runners (B) are screwed to the side rails to carry the nested tables. The tops are



How legs are fitted on.

fixed by screwing up through the rails, or they can be glued on.

To make the set of which a detailed plan is given you would need:

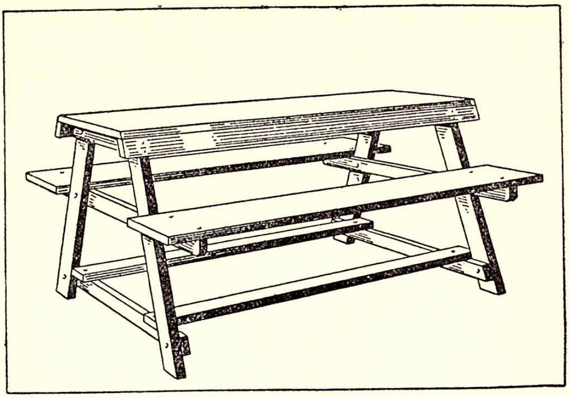


Sectional view of the table.

	Long ft.	Long ins.	Wide ins.	Thick ins.
4 Legs	1	4½	1¼	1¼
4 Ditto	1	3¾	1¼	1¼
4 Ditto	1	3	1¼	1¼
1 Rail	1	5½	2	⅞
1 Ditto	1	2¼	1¾	⅞
2 Ditto		11	1½	⅞
2 Side rails		11¼	2	⅞
2 Ditto		10	1¾	⅞
2 Ditto		8¾	1½	⅞
1 Stretcher	1	5½	⅞	⅝
1 Ditto	1	2¼	⅞	⅝
2 Ditto		11	⅞	⅝
2 Side stretchers		11¼	⅞	⅝
2 Ditto		10	⅞	⅝
2 Ditto		8¾	⅞	⅝
2 Bearers		10⅞	1½	⅝
2 Ditto		9⅝	1½	⅝
1 Top	1	6¾	12½	9-16
1 Ditto	1	3½	11¼	9-16
1 Ditto	1	0¼	10	9-16

All sizes are net. One inch long tenons allowed for.

A Table For The "Bach"



HERE is a useful table, seating four to six people, which can be made strongly if the work is carried out on the plan shown here, or which can be roughly put together if it is merely wanted for a short period. For the summer camp or seaside "bach" it is ideal. This one is 4ft. long but it can, of course, be made any convenient length. It serves a double purpose for it will hold four adults for meals, and afterwards the seats will hold six people, and there is a back rest for them. By using bolts and screws it can be quickly taken to pieces and stored away. The overall size is four feet long by three feet wide over the seat boards. Fig. 2 is drawn to scale.

The best timber to use is rimu, all 1in. planed and dressed, which is actually ⅞in. finished size. The parts required are these:

		Long		Wide	Thick
		ft.	ins.	ins.	ins.
(A)	4 Legs	2	5	2	1⅛
(B)	2 Top bars ..	1	1	2½	1⅛
(C)	2 Seat bars ..	3	0	2½	1⅛
(D)	2 Bottom bars	2	5	2	1⅛
(E)	1 Top rail ..	3	10	2½	1⅛
(F)	2 Back rests .	4	0	2¾	⅞
(G)	2 Foot rails ..	3	8	2¼	1⅛
(H)	1 Table top ..	4	0	12	⅞
(J)	2 Seats	4	0	9	1⅛

Lengths allow for cutting and fitting. Widths may vary slightly according to the stuff in hand.

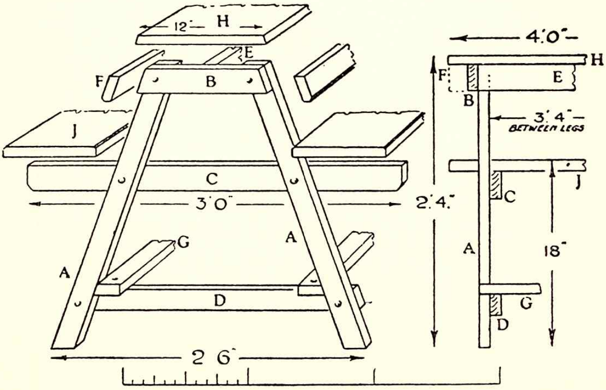


Fig. 2.—Detailed plan of table.

To the legs (A) are bolted the three cross bars (B, C, D). Note that, whilst the top bars (B) are fixed to outer faces of legs, the two other bars (C and D) are fixed *inside*. Use bolts of at least ½in. diameter.

The pair-leg ends are connected by the long top rail (E), by the foot rails (G), and of course also by the back-rests (F), the table top (H) and the two seats (J). If thought necessary, two additional rails (2in. by 1 1-8in.) might be screwed to legs immediately under bars (C).

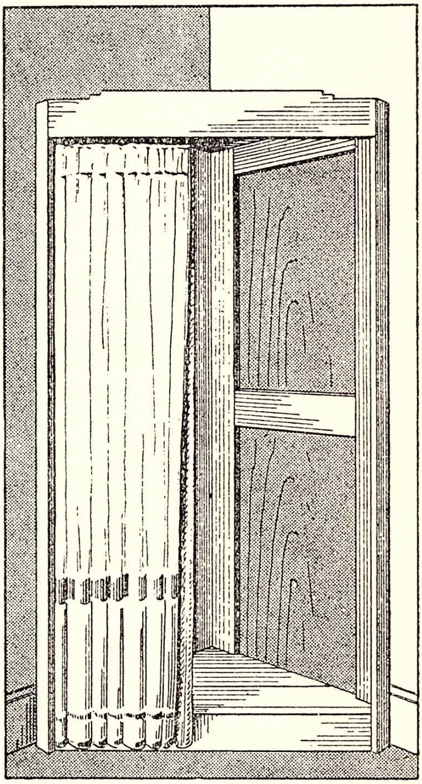
The back-rests, table top and seats are screwed on, with the screw heads well countersunk. Note the slight bevel on table top edges and also the chamfering of the seat edges.

If you want a wider table top, up to 18in., 6in. has to be added to the lengths of the cross bars (B. C. D) and 6in. to width of table.

In the bench shown no joint cutting is required. It will be understood, however, that for a permanent piece on the lines shown the cross bars would be partly let into the legs; the top rail (E) would be dovetail-housed to the top bar (B), and stiffening braces would connect bars (C) to rail (E). The batten rails (G) would also be let into bar (D).

Easily Made Corner Wardrobe

THERE is little need to say very much about the building of a corner wardrobe such as is illustrated here because it can be done in a variety of styles, and its size and finish will depend upon whether it is to be movable or a fixture, permanent or temporary. The simplest type of corner wardrobe is obtained when you merely close off a corner of a room with a piece of timber top and bottom, and hang a curtain. The wardrobe illustrated is intended as a movable one, and has sides. The height would be round about six feet, and ordinary planed and dressed rimu, 1in., would be quite satisfactory to use. The curtain can be hung on a piece of brassed tubing, or if this is not available, on a piece of wooden dowelling. By building it along the lines illustrated, it can be made quite attractive looking.



DON'T economise on your paint. Good quality is cheapest in the long run.

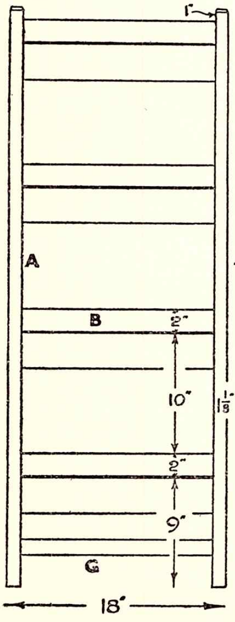
A Vegetable Storage Rack

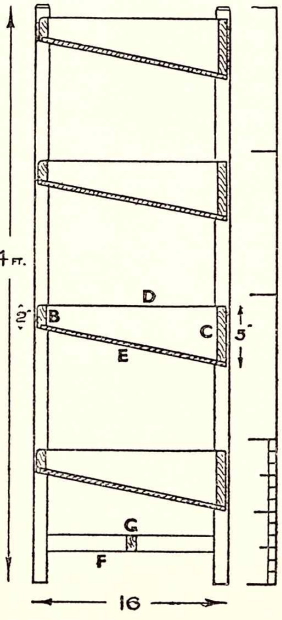
HERE is a plan for the making of a rack for the storing of vegetables and fruit, which can be varied in a dozen different ways to suit your own individual needs. The fixed trays have an inside measurement of approximately $16\frac{1}{2}$in. by 14in., the depth being $1\frac{3}{4}$in. in front and $4\frac{3}{4}$in. at the back. As shown in the diagrams, the work is done by mortising, but the job could be screwed together if desired, and if it were being built-in, the simplest way would be to nail it together, the rigidity of the wall against which it was being built being ample to ensure that it would be firm. It can be made in either O.B. or heart rimu.

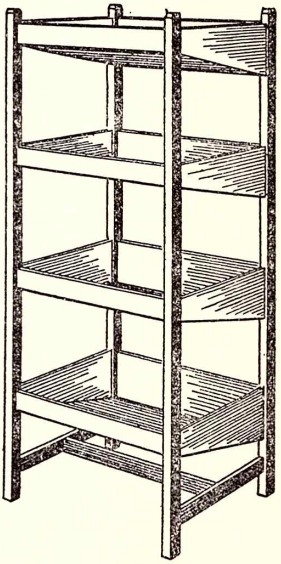
The posts (A) are mortised for the four tray fronts (B), backs (C) and sides (D). The tray parts (B, C, D) are tenoned to the posts, the fronts (B) being rebated for the plywood bottoms (E). These bottoms are cut at the corners to fit around the legs and screwed or nailed on.

The underframing rails (F and G) should not be necessary if the tray sides have been securely fixed, but are shown here to be added if desired.

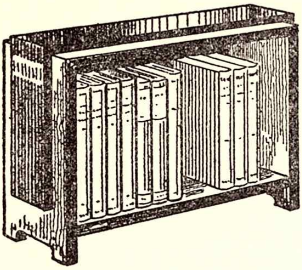
The materials required for the one shown are 4 posts (A) each 4ft. of $1\frac{1}{8}$in. by $1\frac{1}{8}$in; 4 tray fronts (B) each 1ft. 6in. by 2in. by $\frac{7}{8}$in; 4 backs (C) each 1ft. 6in. by 5in. by $\frac{7}{8}$in; 8 sides (D) each 1ft. 4in. by 5in. by $\frac{3}{4}$in; 4 bottoms (E) each 1ft. 6in. by 16in. of three-ply; 2 lower rails (F) each 1ft. 4in. by $1\frac{1}{2}$in. by $\frac{7}{8}$in; and a stretcher (G) 1ft. 6in. by $1\frac{1}{2}$in. by $\frac{7}{8}$in. Note that the two sides (D) may be cut from a piece 16in. by 7in. The lengths allow for joints, but all thicknesses are net.





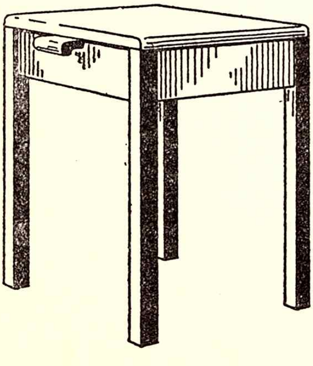


Three Useful Articles



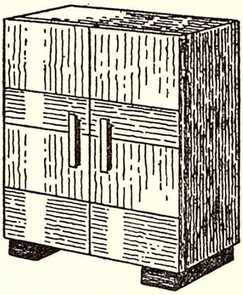
BOOKSHELF

HERE are three useful articles, needed in every home which can practically be made out of oddments of timber. In each case the best method of construction is given, but anyone who has used tools at all could modify the method and simply use nails or screws. The smoker's cabinet could be adapted if desired and form an excellent little shaving cabinet for the bathroom, where it could be either screwed on to or fitted in to the wall. The kitchen stool layout will give you an idea as to how to build a simple little table if you want one anywhere. All that is needed is to increase the measurements a little. Various materials suggest themselves. The most easily obtainable is plain rimu, with three-ply for the backs of the bookshelf and smoker's cabinet, but these backs could also be made out of a small piece of wallboard that you had left over, or out of any thin timber oddment.



KITCHEN STOOL

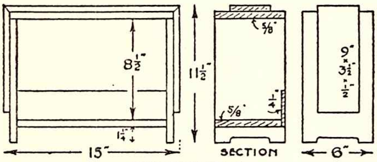
For the smoker's cabinet you will need two ends, 14in. by 7in. by $\frac{1}{2}$in. (1in. timber will do if you have no half-inch material). The top and bottom will each be 11in. by 7in. by $\frac{1}{2}$in., and the back 14in. by 11in. In the diagram the shelves are shown nailed to the back, but if plywood is used this need not be done until they are already fitted in the slots in the sides as shown, in which case there will be no strain on the back. The two toes will be of 7in. by 2in. by 1in., and the two doors 14in. by $5\frac{1}{2}$in. They can be made of any light timber, and veneered (as shown) if desired, or a frame could be made, and hardboard tacked over, giving a nice flush-panelled door which will take a paint like Dynamel beautifully. The two inside shelves will be $10\frac{1}{2}$in. by 7in., and can be made of timber about $\frac{1}{4}$in. thick.



SMOKER'S CABINET

Easily Made Bookshelf

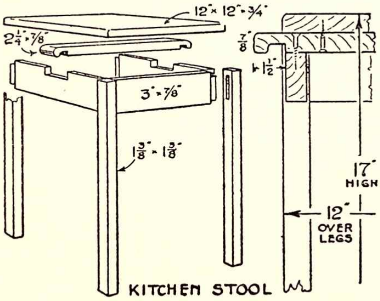
FOR this you need two ends each 11in. by 6in. by $\frac{1}{2}$in. (1in. rimu would do instead), a top, dovetailed to the ends (or simply screwed if you don't think you can make successful dovetails) 14in. by 6in. by ½in. The shelf will be 13½in. by 5¾in. by ½in., the back rail 14in. by 3in. by ¼in., two end slabs 9in. by 3½in. by ½in. (bare), top slab piece 15in. by 3½in. by ½in. (bare). The slab pieces are mitred where they meet, and the shelf is housed to the ends. This is an ideal little bookcase to have in your spare bedroom with a few of your brightest books available to the guest. It can be finished in a colour to harmonise with the room with a high-quality finish such as Dynamel.



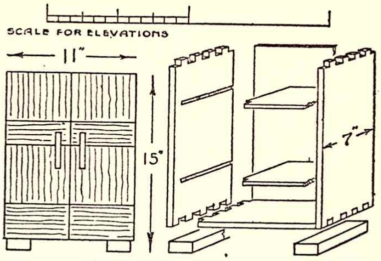
BOOKSHELF

Useful Kitchen Stool

WHY not have comfort when you are working in the kitchen. The stool would make an ideal gift. It is simply made, and can be painted to tone with the room. You will want four legs each 16½in. by 1⅜in. by 1⅜in. (That is, 1½in. in planed and dressed rimu which finishes out at 1⅜in.) The four rails tenoned to the legs will be 11¾in. by 3in. by ⅞in., the cross-batten 15in. by 2¼in. by ⅞in. The projecting ends of this piece can be shaped for fingerholds as shown, or if not desired, can simply be cut out. The batten is let into the rails and screwed. The top will be 12in. by 12in. by ⅞in. Round off the upper edges. The top is screwed through the batten and glue-blocked to the rails. Angle braces may be used to give extra strength if this is thought necessary.



KITCHEN STOOL



SMOKER'S CABINET

CASTORS give trouble from time to time, and small difficulty should be experienced in curing the trouble. The castors attached to wooden furniture are of two kinds: those which screw into the base of the leg, and those which receive the leg in a socket. The former kind often work loose in their hole, and are at all times liable to split the leg if the piece of furniture is heavy and is dragged about violently. As soon as trouble appears, the best plan is to get a completely new set of castors, but of the socket variety. The holes left vacant by the withdrawn screws should be plugged with wood, and it may be necessary, of course, to shape the last inch or so of the leg to fit it into the socket. The large socketed castors fitted to dining-room tables often work loose by reason of the dropping-out of one or more of the holding screws. The best way to treat such a castor is to take it right off, plug the screw holes with wood, and replace the socket so that the holding screws may be driven into new holes that will give a good grip.

Making A Folding Ironing Board

THE average length of an ironing board is about 4ft. with a width of from 9in. to 11in. or more. A convenient height from floor is 3ft., but must be less for a small person. The board, of 1in. planed and dressed rimu, is covered in the usual way with felt or flannel under an outer sheeting. Thin lengths of stripwood are sometimes fitted at the square end as shown to keep the iron from slipping (see C).

The paired legs are of different lengths to provide the necessary balance—the larger pair (A) from 3ft. 10in. to 4ft., and the shorter pair (which folds inside the longer) tapering from, say, 13½ to 8½in. The legs may be of 1½in. by ⅝in. hardwood or of heart rimu. Each pair of legs is strengthened by crossed braces (D) of ⅝in. by ⅜in. strip, whilst the short pair has, in addition, a cross rail (E) let in 2in. from top.

FIG. 2

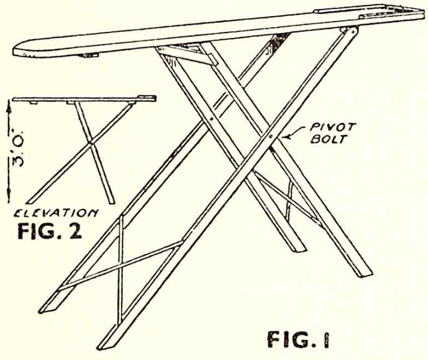


FIG. 1

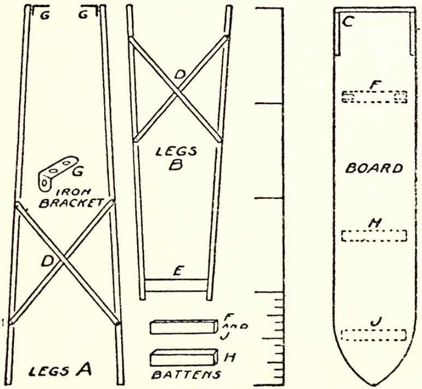
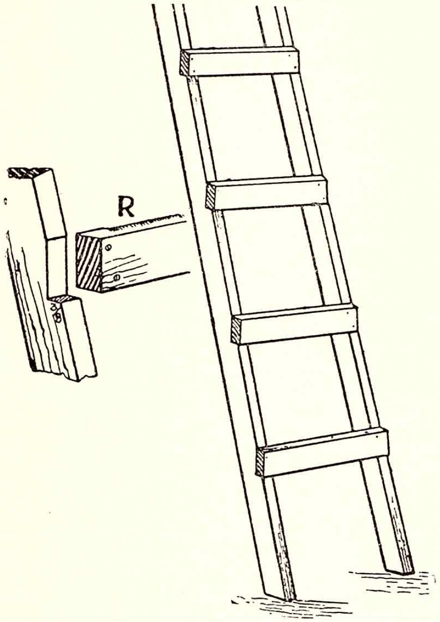


FIG. 3

To the underside of board three battens (8in. by 1½in. by ⅞in.) are screwed. To batten (F) the larger pair of legs is hung by means of two iron brackets (G), the brackets being screwed to the batten and pivot-screwed to each leg. In this way the pair-leg folds flat against the board. The shorter pair-legs are pivot-bolted inside the longer pair, their top ends butting against the middle batten (H) when the table is in use. The third batten (J) is merely for strengthening purposes. The point for the pivot bolts must be determined finally by trial. This can be done before the article is assembled by laying a long and a short leg on the floor and arranging these so that (*a*) the board will be parallel with the floor line and (*b*) will be the correct height from floor (see Fig. 2). Later, the necessary adjustment can be made by the positioning of the centre batten (H) and by slight trimming of the legs at the foot. The pivoting bolts which hold the legs should be provided with brass or iron washers.

To Make A Ladder

LADDERS are expensive to buy, but not very difficult to make, and not very costly if you make them yourself. The ideal material to make them from is oregon pine with good straight grain, but this is fairly difficult to obtain now. Depending on the height of the ladder, you would need either 3in. by 2in. planed and dressed, or 4in. by 2in. planed and dressed timber for the sides, and 2in. by $1\frac{1}{2}$in. or $2\frac{1}{2}$in. by $1\frac{1}{2}$in. for the staves. Good quality O.B. rimu will be found fairly satisfactory, but if you use this you should paint the ladder well, and see that it is kept painted.



Hardwood makes good ladders, but they are expensive to make, and too heavy for carrying about if they are of considerable length.

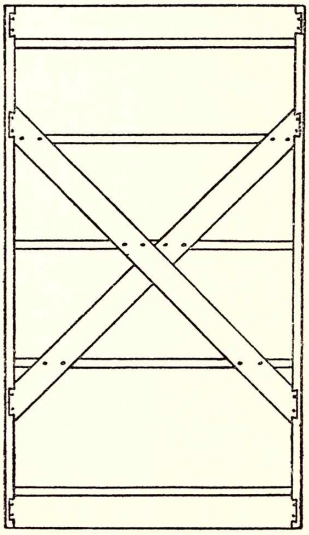
The staves should be from 9in. to $10\frac{1}{2}$in. apart, and when you are making the ladder it is a good plan to cut them so that they overhang the sides by about an inch. This allows you to bore the screw-holes without risk of the wood splitting at the end, and when they are screwed into place, you can cut them off even with the sides.

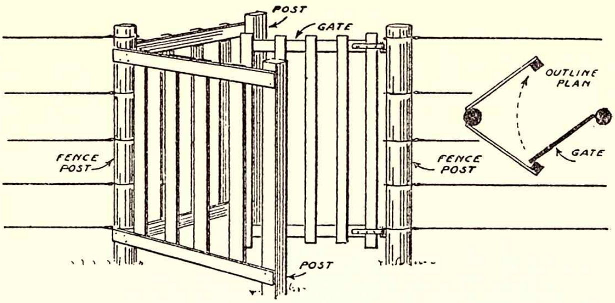
The illustration shows one method of joining the staves to the sides, by letting them into a $\frac{3}{8}$in. notch. An additional security can be given by stapling a wire over each end of the stave.

Another method is to let the $1\frac{1}{2}$in. stave into a square-cut notch to a depth of $\frac{3}{4}$in. Either method is quite effective. Screws should be used in preference to nails, but if the latter are used they should be punched about $\frac{1}{8}$in. under the surface and the hole well puttied. A good quality chocolate paint is just about ideal for use on ladders.

Putting Up Light Shelves

THE easiest things to put up are shelves, whether these be in the kitchen or pantry for jam, or bookshelves, which are dealt with elsewhere. If shelves are being nailed or screwed to existing walls, they need no extra bracing, because the rigidity of those walls gives them the needed strength. If on the other hand they are to stand on their own against a wall, it is quite a good plan to brace them at the





TYPICAL RIGHT-OF-WAY GATE.

back. The brace will be let into the wood at the back sufficiently far to allow the back to finish flush, and added strength is given it by nailing it to the shelves also, as shown in the diagram. Where the braces cross, they are halved.

When building shelves for specific purposes such as the holding of jam or bottled fruit, it is essential to measure up your jars carefully beforehand and allow sufficient space betwen shelves to allow them to move in and out easily. Where sufficient room is available, the ideal method of storing jam, etc., is to have narrow shelves sufficiently deep to take one jar only. This obviates the usual trouble in pantries, etc., where jars get to the back of deep shelves, and can't be found when wanted.

A Useful Right-of-Way Gate

IN country districts there are many advantages in having right-of-way gates such as that illustrated here, because they do away with all the anxiety as to whether users have closed the gate being, as they are, of sufficient size to allow people to pass through, but too small to let animals through. These gates will naturally vary considerably in size and weight according to the amount of usage they will get, but the principle is always the same. The gate opens rather less than a quarter of a circle, as can be seen in the outline plan, butting in its swing, against each side post. To pass through the restricted entry, the gate is swung first in one direction and then in the other.

An averaged-sized gate is about 2ft. wide by 3ft. 6in. high and can be constructed either by nailing, by screwing, or by making halved joints. The position of the two side posts is important. In distance apart they must allow for the passage of a man of average build, whilst, too, they must be so placed that the gate shuts on each. Again, because most people passing through bang the gate on both posts, they must be firmly let into the ground. These side posts are connected to the far fence post with horizontal bars, the uprights being nailed on. The illustration should be a sufficient guide to anyone wanting to make such a right-of-way gate.

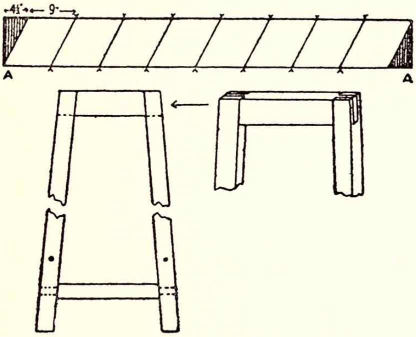
WHENEVER you are setting out to construct an article or piece of furniture, plan it out on paper first. You can then work out the exact sizes and quantities of timber needed, and can order in such a way that you will have no waste.

Making Household Steps

AT first sight, because of the way they are bevelled, household steps look as though they would be complicated to make, but actually they are not, and if the instructions given here are carefully followed you will have a very good pair of steps.

For the side pieces, ordinary 5in. by 1in. matai or heart rimu will do very well. Select boards which are free from large knots, likely to weaken the side. Lay them side by side and knock a couple of nails through them so that the boards are temporarily held together. This will facilitate the marking out, and ensure that the steps will be even.

The marking is most important. First, from each end of the pair of boards, measure 4½in. and draw two lines at right angles to the edges of the boards. Now draw two diagonal lines (see illustration) and saw the triangular pieces left from each end of the pair of boards. This will ensure that each side will stand firmly on the floor and will lean forward to the same extent. Your steps should be about 9in. apart, so now mark off along one edge of the boards a series of points each exactly 9in. from the other; turn the boards over and do the same along the other edge.



How to cut out steps.

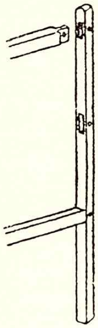
The boards may now be separated, and each should be clearly marked with an "in" and an "out" side. On the "in" sides draw lines between the V's on the edges, and one inch below each line draw another. Each of these pairs of lines represents the groove to be cut to receive the end of a step. Having cut the grooves and cleared them of splinters, etc., the actual steps may be cut, also from 5in. by 1in. floorboard.. It will be noticed that the lower steps are wider than those near the top: this tapering helps the stability of the steps. The lowest step may be about 16in.; the top about 9in. If these two are cut and fitted (due care being taken to get the steps and sides four square) the remaining steps can be cut to fit, merely by measuring the distance between the bottoms of the respective grooves. Steps should be nailed in position.

Immediately below the lowest step but one, a piece of 5in. by 1in. should be set in, its upper edge being nailed to the back of the step, and its ends nailed to the side pieces; and another piece of 5in. by 1in. should be nailed across the back of the steps at the top. Finally, the top piece should be put on, overlapping each side by about ¾in.

The strut may be formed by ripping a piece of the 5in. by 1in. board into two pieces, 2½in. wide by 4ft. 10in. long. Plane them up and then mortise and tenon, almost at right angles, a piece of 5in. by 1in. at the top, and, 18in. from the bottom, a piece of 2½in. by 1in. The legs of this strut should be splayed to the same extent as the uprights of the steps. The joints should be well made and secured with glue and a single screw each. The strut is fixed to the steps with a hinge, and two lengths of sash-cord are passed through holes lower down to adjust the strut to the right distance of extension.

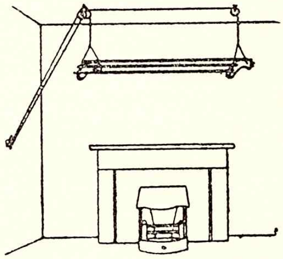
A Clothes Horse

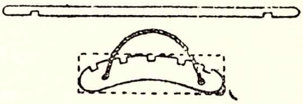
A CLOTHES HORSE simply consists of two sides, joined together with a couple of hinges. The height and length really depends upon what size of household it is being used for. A useful size is about 4ft. 6in. high by 3ft. 6in. wide. The best way of making it is by mortising and tenoning the rails as shown in the illustration, but they could be dowel jointed if you think that way is easier. This is not a thing that could be made by screwing or nailing only. Certain of those sold in the cheaper stores are made that way, but last no time at all. Use brass hinges for joining the two sections; metal hinges will rust and damage the clothes. Upholsterer's webbing can be used for them, if preferred.



A Clothes Airer

TWO end pieces are cut from 1in. board, each 2ft. 6in. by 6in. They can be left rectangular (see illustration), but a little work with plane and saw or a stout penknife, or, better, a spokeshave, will suffice to turn out the ends to the shape indicated and add to the appearance of the finished job. Now prepare five rails, each of 2in. by 3in. battening and of a length to suit the room, and six inches from each end of each rail cut a notch one inch wide by one inch deep. In each of the two end pieces cut five similar notches 1in by 1in.(make sure that these notches are directly opposite to each other). Do not nail the rails to the end pieces, for fear of marking any clothes; the joints should be cut closely enough to hold without nails. Holes should be bored in the end pieces, when all is ready, to take the cord. The rail is suspended from the ceiling by one double pulley and one single pulley.





GLUE is bought by the pound, at any hardware shop. The cake of glue should be broken into small pieces and placed in a small jam-jar, or in the inner receptacle of a glue-pot if you possess such a luxury. Just cover the glue with cold water, and let it soak overnight, or at any rate for, say, four hours; then pour off the surplus water—i.e., that which has not been affected by the dissolving glue. If you have a proper glue-pot, you will not need instructions as to boiling; but is using a jam-jar, place the jar in a saucepan large enough to contain plenty of water in addition to the jam-jar; otherwise the water will boil away before the glue is properly heated. Re-heated glue is weaker than fresh glue; make only enough to meet your immediate requirements. Use the glue hot. Its thickness should be about that of new cream, and it should run freely from the brust.

How to Mix and Make Concrete

CONCRETE round the home is invaluable both for paths, for embankments, and for such minor garden ornaments as bird baths. Many people to-day recognise that concrete is easily made provided instructions are accurately followed, and do not hesitate to undertake their own work about the place. It is our object in the following pages to give such information as the amateur needs in a non-technical way so that he can make the right type of concrete for whatever use he desires.

Portland cement is a standardised product which is sold in bags that run out at 18 to the ton, each containing 125lb. It readily absorbs moisture from the atmosphere so should not be exposed to damp, but carefully stored in a dry place. In the making of concrete two other things are needed, broken stone or gravel, and sand. The sand must be clean and free from clay, earth or other matter to which the cement will not properly adhere, and it should be coarse so as to present less surface than fine sand, thus securing the maximum of strength with the minimum usage of cement. The salt in sea-sand tends to retard the setting and hardening of concrete, although it has no effect upon its final quality other than, at times, to give it rather a whitish appearance.

The selection of the right type of clean, broken stone is important, for cement is somewhat similar in its charactertistics to glue. The addition of just the right proportion of water tends to bring the mixture up to its maximum strength, while too much water tends to weaken the cement's adhesive capacity. The function of the cement and water when mixed in true proportions is therefore to act like a glue and bind the sand and coarse materials together.

Measuring Your Materials Requires Care

IT is false economy to make concrete better or stronger than is necessary for the particular job in hand, so the proportions of the different materials should be selected according to the known qualities of concrete and in accordance with the table published further on in this section. Where a very good concrete is required, as in the case of water-tank construction, or important reinforced work, the proportions usually adopted are 1 part by volume of Portland cement to 1½ parts of sand and 3 parts coarse material. Only in very exceptional circumstances is a richer concrete than this ever used. For ordinary purposes the proportions usually adopted are 1-2-4, while for a medium quality concrete, such as is used for foundations, the proportions should be 1-2½-5. For heavy walls and foundations, piers and other structures where actual strength is not so important as weight and stability, the proportions may be 1-3-6.

Almost invariably, particularly for amateur working, it is easiest to work by volume and a very handy measuring box can be made from a benzine box or similar-sized container, which holds about 1½ cubic feet. As about a third of a cubic yard of concrete is generally sufficient to have on the mixing board for a small job, this volume can be made up for a 1-2-4 mixture by taking one benzine case of cement to two cases of sand and four cases of coarse aggregate. Too much care cannot be taken in the exact measurement of all the materials, and later in the exact measurement of the water used.

How The Materials Are Mixed

THE object in concrete mixing is the production of a solid and dense mass in which every small hole or void is completely filled, and every particle of sand and stone coated with and bound together by the cement. To accomplish this the mixing of the materials and the addition of the water must be very thoroughly and correctly carried out. For this purpose a good clear space about 7ft. wide and 12ft. long is desirable, for this is large enough to permit two men using shovels to work at the one time. The best method is to work on a watertight wooden platform made of thick boards, but where amateurs have but a small amount of work to be done, it can frequently be carried out on a piece of concrete, or other paving, provided it is absolutely level.

The usual procedure in hand mixing is as follows: The measured quantity of sand is spread out evenly on the platform. On this the required amount of cement is dumped and evenly distributed. The cement and sand are then turned over thoroughly with square-nosed shovels enough times to produce a mass of uniform colour, free from streaks of brown and grey. Such streaks indicate that the sand and cement have not been thoroughly mixed. The required quantity of pebbles or broken stone is then measured and spread in a layer on top of the cement-sand mixture and all of the materials again mixed by turning with shovels until the pebbles have been uniformly distributed throughout the mixed cement and sand. At least three turnings are necessary. A depression or hollow is then formed in the centre of the pile and water slowly added while the materials are turned with square-nosed shovels, this turning being continued until the cement, sand and pebbles have been thoroughly and uniformly combined and the desired consistency or wetness obtained throughout the mixture.

It is very important that no more water be used than necessary, as too much will reduce the strength of the concrete. Too little will also reduce its strength and make it porous. For general use, concrete after thoroughly mixing should be wet enough to form a mass of paste or jelly-like consistency, but never so wet as to flow easily or be soupy.

Placing The Concrete In Forms

CONCRETE should be placed in forms as soon as possible after mixing, and in no case more than 30 minutes later. It should be deposited in layers of uniform depth, usually not exceeding 6 inches. When placed in the forms it should be tamped and spaded so as to cause it to settle thoroughly everywhere in the forms and produce a dense mass. By "spading"is meant the working of a spade or chisel edge board in the concrete and between it and the side of the forms, moving the spading tool to and fro and up and down. This working of the concrete next to the forms forces the large pebbles or stone particles away from the form face into the mass of concrete and insures an even, dense surface when forms are removed.

If concrete is left exposed to the sun and wind before it has properly hardened, much of the water necessary to hardening will evaporate and the concrete will simply dry out. Moisture is necessary to the proper hardening of concrete because, as already mentioned, the hardening process is a chemical change which takes place in the cement when mixed with water. Concrete floors, footpaths, pavements, and similar large surfaces can be protected by covering with moist earth, sand or other moisture-retaining material as soon as the concrete has hardened sufficiently to do so without marring the surface. This covering should be kept moist in warm weather by frequent sprinkling during a period of 10 days or so. Walls or other sections which cannot conveniently be covered in this manner can be protected by hanging moist canvas or hessian over them and wetting down the entire work often enough to keep it always moist for 10 days after placing. During cold weather, protection is equally important, but the concrete may not need to be kept moist, as evaporation is not so rapid.

How To Make And Handle Forms

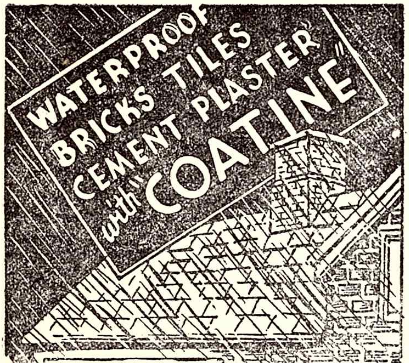
FORMS are the receptacles in which concrete is placed so that it will have the desired shape or outline when hardened. Forms are generally constructed of wood, and where a smooth surface is required, planed timber is best. Finished concrete will have no smoother surface than your forms. Rough work forms can be made from rough timber, but for smooth, finished work get good dressed timber and use tongue and grooved material so that the forms will be tight. A very useful material—relatively cheap—where it is available, can be found in motor cases. Near the main cities this timber is very cheaply available. Even for plain work timber that has been dressed on at least one side and on the edges is best, because the boards will fit closely together and prevent leakage.

Forms should be built up in sections or panels so constructed that they can be easily removed. They should be constructed, too, so that they can be taken down with the least amount of hammering, thus preventing possible injury to the concrete before it has thoroughly hardened. For foundation work below ground level, forms will not be necessary if the earth is so firm that the sides of the excavation will stand without caving. When placing and tamping the concrete, however, care must be taken not to knock down the earth into the concrete, as this will cause weak and porous spots in the wall.

To prevent adhesion of the concrete to the forms, and make their removal easy, the forms should be well greased. Old motor-car oil or soft soap are generally used, but whitewash can also be used if the others are not available. Before being used again forms should be very carefully cleaned of all concrete, and then reoiled.

Removal Of The Forms

FORMS must not be removed or stripped until the concrete has thoroughly hardened. The time required cannot be definitely stated as so much depends on the nature of the work and local temperature and weather conditions. In summer weather wall forms can generally be stripped after two days, and in cooler weather in from four to seven days. If the concrete is still soft or yielding it should on no account be stripped, and should it have frozen it must be left in the forms until it has thawed and then watched until it hardens properly. Heat hastens and cold delays the hardening of concrete. Never remove your forms until you are certain that the concrete has hardened.



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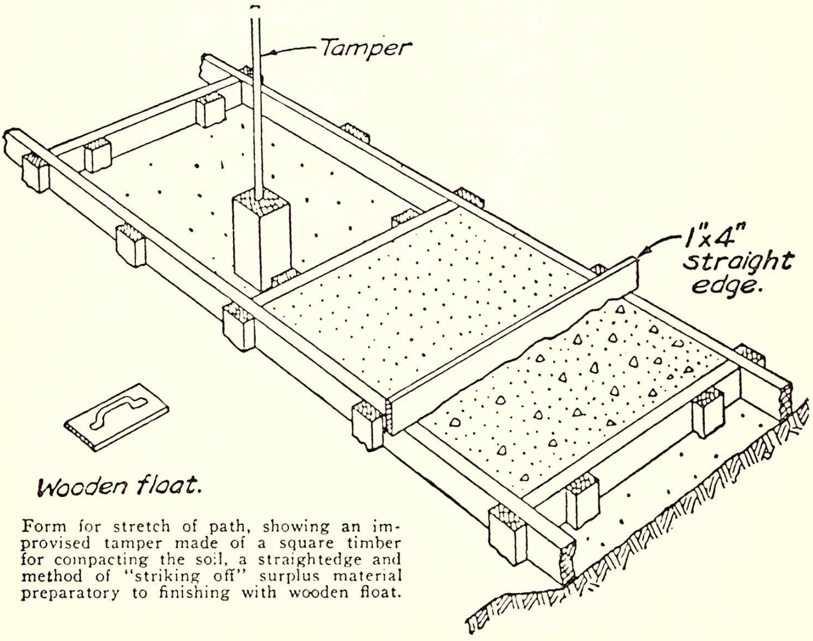
Making Concrete Paths

THE beginner need not hesitate to build concrete floors or paths, or to do similar concete work. The principles which apply to the construction of a concrete footpath apply also to the construction of a floor, as a floor is in all essentials like a number of footpaths placed side by side. Walks, floors and footpaths should always rest on a good, firm base. If the soil on which they are to be laid is well drained the concrete can be placed directly on it after all loam refuse, grass roots and other perishable material have been removed, and the area has been well compacted. If the soil is not well drained a sub-base should be provided of good, clean cinders, or coarse gravel. Usually 4 by 2's securely staked in position are used as the side-forms for footpath construction. Pavements are laid either as a one-course construction or as a two-course construction, one-course being where the full thickness is laid at the one time, and two-course being where a coarse mixture is laid at the bottom and a finer mixture on top. One-course construction is usually the better.

How You Can Avoid Unsightly Shrinkage Cracks.

SO that irregular shrinkage cracks can be avoided, the concrete should not be permitted to strain itself by adhering to, or keying into the ground. The best way to avoid this is to spread a bed of sand or other granular material, such as shingle or cinders, over the soil before placing the concrete. If you are using a fine sand, a layer $\frac{1}{4}$-inch thick



Form for stretch of path, showing an improvised tamper made of a square timber for compacting the soil, a straightedge and method of "striking off" surplus material preparatory to finishing with wooden float.

will be sufficient, but if coarser bedding material is used the bed may have to be about an inch thick to work effectively. It is necessary to allow for the thickness of this bed when making the side forms; if, for instance, you want a 3-inch thickness of concrete your forms will want to be 4 inches deep if you have a bed of cinders an inch deep.

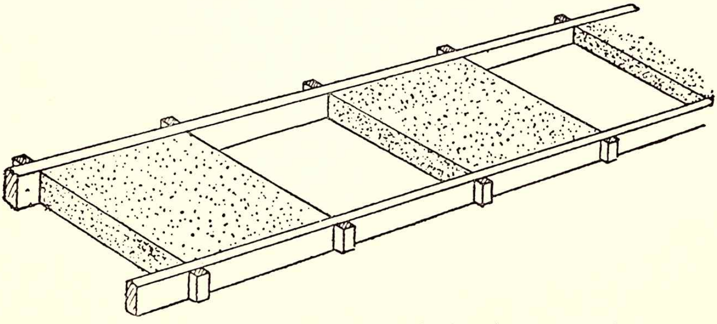
The bedding material should not be spread until the side forms are in position, when it is easy to see that your bed is level. In this way, too, the bedding material may be used as a leveller-up of low places, and in this way it will frequently pay for itself by saving thick patches in the concrete.

The Amateur Finds One Course Work Easiest

ONE course work is much the easiest for the amateur, is cheaper in material cost, and has the advantage that the work can proceed continuously along the path. The diagrams in this section illustrate quite clearly the way in which the various operations are carried out and checked, and if you have never made concrete before you should study them carefully and make certain you understand them before going ahead with the job.

The first thing to do is to set out your path with the forms in position so that once the concrete mixing starts you can carry straight ahead. Any type of timber does for these, but the surface which will be next to the concrete should be greased. Used motor oil is satisfactory for this purpose. Ordinary 4 x 2 building timber can be used, or 4 x 1, or timber cut from packing cases to the required width. If you have no suitable timber handy, it will pay you to buy a small quantity of rough ordinary building timber of either of the sizes mentioned, as the use of a ready-cut-to-size timber will save you time, and the timber will probably come in useful again later. This timber must be securely nailed to pegs on the outside, as illustrated, care being taken to see that it is at right angles to the ground so that the edge of the path will be neat.

All concrete shrinks in curing, so cracks would develop if steps were not taken to overcome that. The best way to handle this, in the case of paths, is to fix thin wooden partitions about ⅜in. thick, and



Alternate sections of Concrete set in form, ready for placing completing sections.

about $\frac{1}{2}$in. less deep than the concrete will be (so that these will be covered by $\frac{1}{2}$in. of concrete) at intervals of about 6ft. These partitions are secured by pegs, and the concrete poured over them. Later, as the concrete shrinks, very fine cracks may develop above these, but they will hardly be noticeable, and will be much less unsightly than the irregular cracks which would otherwise develop eventually.

How To Estimate And Mix Your Concrete

A SATISFACTORY concrete for footpaths can be made by mixing 4 cubic feet of sand (measured damp and loose) and $7\frac{3}{4}$ cubic feet of loosely measured 1-inch graded gravel, with one bag of cement, using about 8 gallons of water for the mixing. With ordinary materials the quantities required to concrete 100 square feet to a depth of three inches will be approximately as follows:—

1-inch graded gravel	27 cubic feet
Sand	14 cubic feet
Cement	$3\frac{1}{2}$ bags

In addition to the above quantities a further 3 cubic feet of sand will be needed if you wish to have $\frac{1}{4}$-inch bedding of sand under the concrete. The cost, where materials are within reasonable distance, works out at round about 35/- per 100 square feet where you are doing the job yourself.

The concrete should then be mixed in accordance with the directions given on page 121, great care being taken to have the exact quantities of materials in the mix (you ensure this by using the mixing boxes) and to use only the quantity of water required. If you do not do this, the concrete will be weaker than it should be. You cannot be too careful to mix thoroughly.

Placing, Finishing and Curing Your Concrete

THE mixed concrete (which should be too stiff to flow out flat) should be beaten flush to the side-forms with a rammer made of, say, 4 x 2, and the ramming should be sufficient to knock down any stones which are showing, and to work up a nice wet surface. Leave this newly placed concrete for two or three hours, when the water glaze will be just disappearing from the surface. Then lightly beat the surface again with a wooden float (piece of 8 x 1 about 12in. long, to which you have fixed a handle is suitable), so that the surface will have the desired finish. When the concrete is 10-12 hours old, cover with wet bags, wet straw, Sisalkraft or other suitable material, and keep the covering damp for about a week. If you are making big quantities of concrete it will pay you to use Sisalkraft, as no further wetting or other treatment is then needed.

Recommended Mixtures In Concrete Work

WITH a view to assisting those many people who wished to make concrete of one type or another, the Australian Cement Manufacturers' Association some years ago worked out carefully the quantities of sand, gravel (coarse aggregate), cement and water, needed for various types of work. These are given below in the table, and can be used for calculating quantities of materials for those classes of work for which specific instructions are not given in "Do It Yourself."

RECOMMENDED MIXTURES FOR SEVERAL CLASSES OF CONSTRUCTION.

(Intended primarily for use on small jobs.)

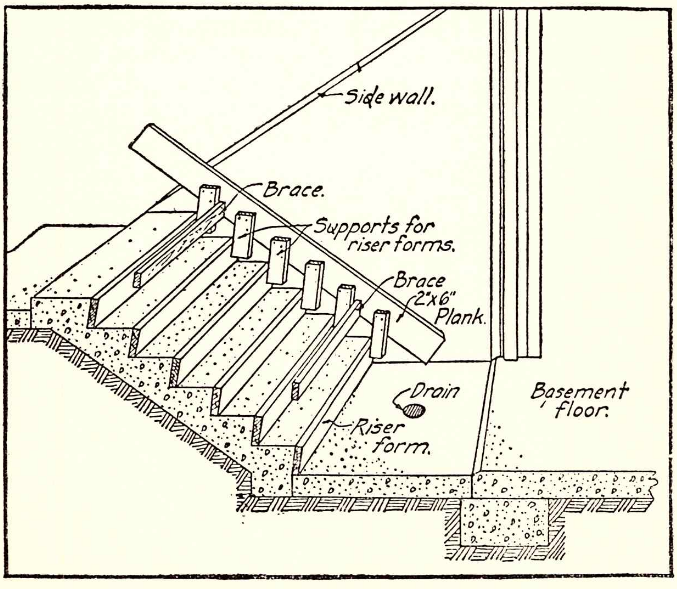
KIND OF WORK.	Imperial Gallons of Water to Add to Each One Bag Batch.			Trial Mixture for First Batch.			Maximum Coarse Aggregate Size Inches.
	Dry Sand and Coarse Aggregate.	Moist Sand and Coarse Aggregate.	Wet Sand and Coarse Aggregate.	Cement. Jute Bags.	Sand. Cub. ft.	Coarse Aggregate. Cub. ft.	
Foundation walls which need not be watertight, mass concrete for footings, retaining walls, garden walls, etc.	6¼	5	4½	¾	3	5	2
Watertight basement walls and pits, walls above grounds, dams, lawn rollers, hand tamper, storage bins, cellar walls, etc. ..	5½	4¼	3½	¾	2½	3½	1½
Water storage tanks, well curbs and platforms, septic tanks, watertight floors, carriageways, footpaths, stepping-stone and flagstone walks, driveways, porch floors, garden and lawn pools, steps, corner posts, gate posts, piers, columns, chimney caps	4½	3½	3¼	¾	2	3	1
Fence posts, clothes line posts, mail box posts, flower boxes and pots, benches, bird baths, sundials, pedestals and other garden furniture, work of very thin sections ..	3¾	3¼	3	¾	2	3	¾

Building Concrete Steps

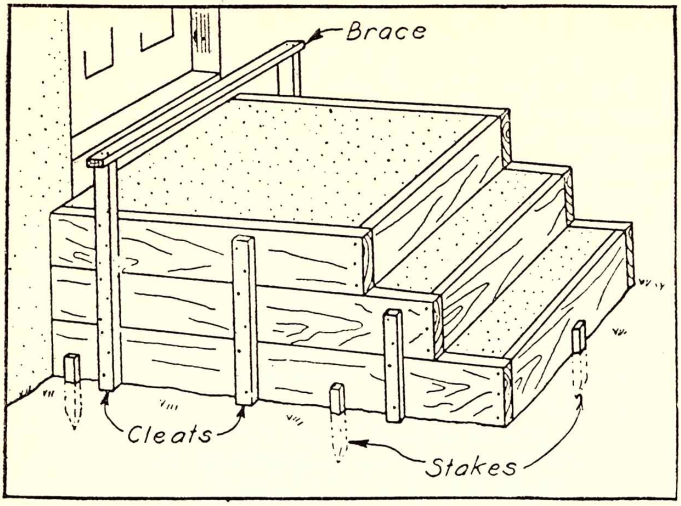
MOST concrete steps are fairly easy to make, but if it is necessary to construct steps to a height where a good deal of reinforcement is needed, it will be advisable to get the advice of an expert. It is not easy to reinforce steps in such a way as to ensure their strength and stability, but the making of the usual concrete steps needed round a house or farm involves little difficulty. Study the diagrams illustrating this article carefully, and you will easily follow the directions.

A simple form for the moulding of a set of steps which are supported by a bank or terrace with sloping foundation can be made as follows: Excavate the earth on the slope to the desired depth, and if necessary, put in porous foundation with a drain at the lower end to dispose of any water that may accumulate. Then take two planks the length of a flight of steps on the slope and wide enough to house each step. Then mark upon these planks the position of the "riser" for each step. Place the planks edgewise on each side of the slope, bracing them well on the outside. Now set boards between the two housing planks placed perpendicularly to form the rise of each step on the lines previously marked and arranged so that there is a space below them for a continuous slab of concrete. This slab should be from three to seven inches thick. The perpendicular cross-boards should be fastened to the housing planks with cleats in such a way that they can be removed without any disturbance.

When steps are built with side-walls, the latter are constructed first, using the same type of forms as in the construction of walls described in preceding chapters. When the side-walls have hardened, the forms



Form For Steps Supported By Bank.



Form For Making Steps.

are removed; the space under the steps being filled with earth and thoroughly tamped to provide a firm base on which to place the concrete-steps. This class of steps does not require reinforcement. Details of the construction are shown in the accompanying illustration.

The planks for supporting the riser forms are held firmly in place against the previously built side-walls by means of 1in. by 4in. braces. The riser forms are then placed and held either by cleats or nails. The concrete mix is then placed and well tamped. The concrete should be a rather stiff consistency and contain sufficient mortar to produce smooth even surfaces. It should be finished with a wooden float so that a smooth yet gritty surface is produced. Curing should be done in the approved manner by keeping the concrete wet, or covering carefully with "Sisalkraft."

In a one-course construction it is generally advisable to use a 1:2:3 mix, being one part cement to two parts sand and three parts gravel or broken stone.

How To Build Concrete Walls

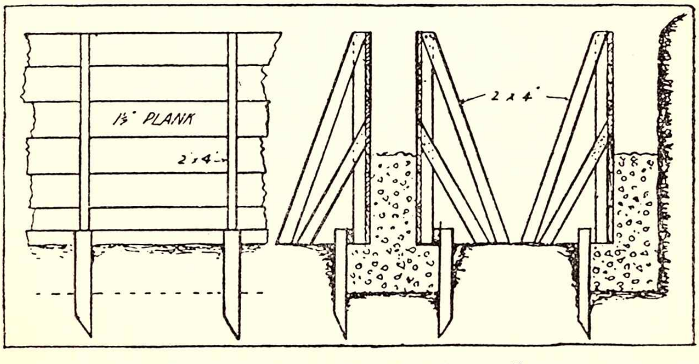
PROVIDED you can follow fairly simple directions and carry out the work with care, the building of concrete walls in your property calls for no special skill, and you will be amazed at the variety and attractiveness of the work which can be planned and executed. In constructing a wall, it is necessary to first dig a trench to a firm foundation. It is advisable to dig at least two feet into the soil. Footings and foundations of concrete walls must have sufficient strength to support the weight of any superstructure to be placed upon them.

Concrete foundations must be placed upon a firm base. If loam or vegetable matter is encountered it must be removed. The width of a properly designed concrete foundation should be such that the soil is loaded with a weight not greater than it can safely carry without the possibility of settlement. For foundations and other walls below ground, where the earth is firm enough to stand, the concrete mix is often placed directly against the face of the excavation cut true to surface. Generally though, it is more economical to use wooden forms to save concrete.

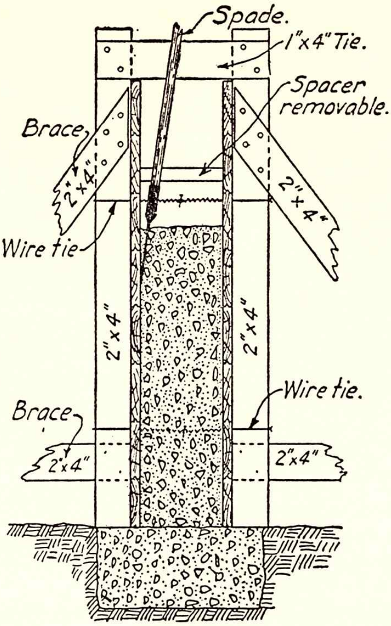
The form for a straight wall is the most common type and is shown in an illustration. Forms are usually made of 6in. by 1in. timber, nailed to 4in. by 2in. uprights spaced about three feet apart. The form for one side of the wall should be lined up and plumbed to make certain that it is absolutely perpendicular, and then it must be thoroughly braced by diagonals running from the posts to the stakes driven into the ground. The forms for the opposite side of the wall should then be set up and secured by ties and braces to the one already in position.

Preparing The Forms and Using Spacers

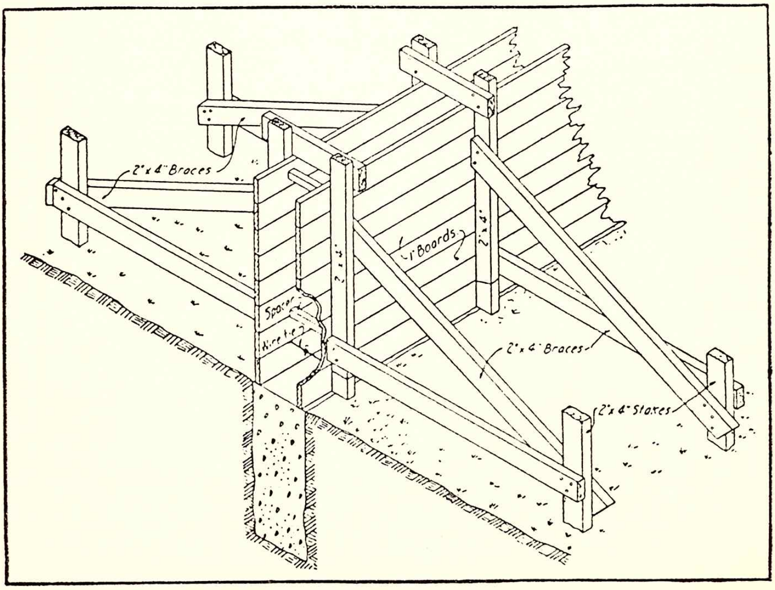
THE face boards of the forms should be nailed to the studs or posts as lightly as is consistent with keeping them in place until the concrete is poured, as heavily nailed forms cannot be torn apart without considerable injury to the timber. The nails should not be driven home, so that they can readily be drawn out. It will help to preserve the



Forms for low wall and cellar wall.


Spade.
1"x4" Tie.
Spacer removable.
Brace
2"x4"
2"x4"
Wire tie
2"x4"
2"x4"
Wire tie.
Brace
2"x4"
2"x4"

Cross section of wall, illustrating "spading down" the face of the form to work coarse material back into mix.


2"x4" Braces
1" Boards
2"x4"
2"x4"
Spacer
Wire tie
2"x4" Braces
2"x4" Stakes

Form for an outside wall above the surface.

forms and prevent the concrete sticking to them if they are covered with a coat of crude oil, used motor oil, or soft soap. If this is not done, they should certainly be wet down immediately before the concrete mix is placed.

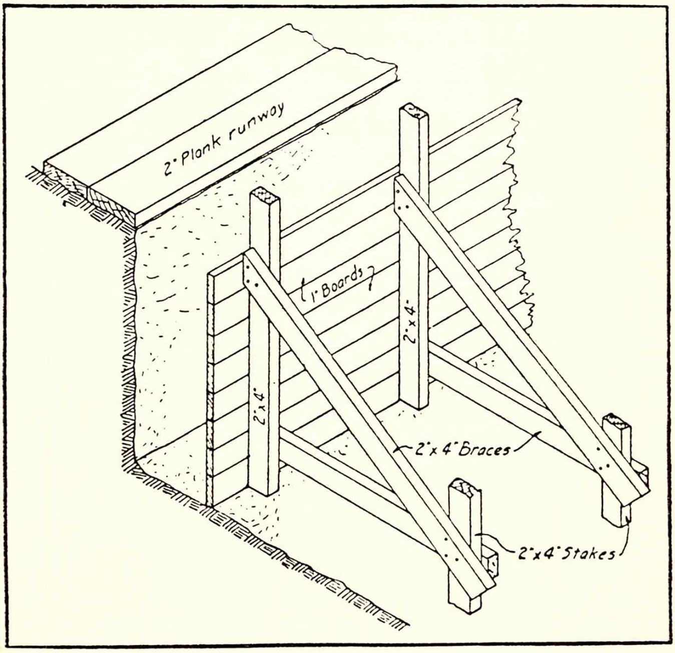
When placed in forms concrete exerts considerable pressure. The forms must therefore be tied and braced sufficiently to resist this pressure, otherwise bulging walls will result. Wherever practicable, the ties should extend through the wall from one form to the other, taking up the pressure. These ties may be made of No. 10 fencing wire passed around the posts on opposite sides of the wall in a loop and then twisted up by means of a rod or stick.

Sticks about 1in. by 2in. and of a length exactly equal to the thickness of the wall desired, should be used for "spacers" between the forms. The "spacers" prevent the forms being placed too close together and should be placed near each tie when it is being twisted up. They should be removed before they are covered by the concrete mix as it is being placed.

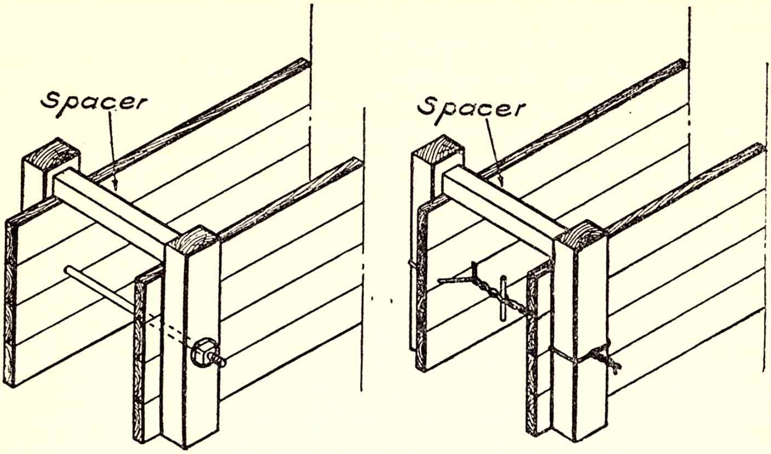
After the concrete becomes thoroughly set the tie wires may be cut and the forms moved along the wall to be used again; any protruding wires may then be clipped close to the face of the concrete.

Placing The Concrete and Joining Wall Sections

THE concrete mix should be placed without delay in the forms in layers about 6 to 10 inches deep, and well tamped and spaded to



Forms for Foundations or retaining wall where the earth serves as one side of the form.



Two types of " braces " for holding the faces of the wall forms together.

avoid pockets of the stone forming in the concrete. A smooth face on the surface of the concrete is secured by thrusting a spade or thin paddle between the concrete mass and the form, moving the spade to and fro and up and down until the broken stone in the concrete is forced back and a coating of the mortar is brought to the face of the wall. Care taken in this spading work will give a smooth surface to walls and save time and expense in plastering over cavities or smoothing rough places. If care has been taken to see that the face of the form is smooth and well jointed, and that the concrete mix has been well tamped and adequately spaded down the face of the forms, the outside surfaces of walls should be generally satisfactory if left just as they come from the forms.

Fresh concrete will not bond readily to concrete which has already been set; in warm weather even an hour is sufficient time for the concrete to stiffen up. This results in seams being formed between sections of wall which have not been constructed continuously. To avoid such seams the end of each completed section should be left rough when work is stopped; then when work is begun again, the scum should be carefully cleaned off, and a rich mortar of about 1:1, mixed to a creamy consistency, should be applied to the end of the completed surface of the wall as the new section is being joined up with it.

Removing Forms and Finishing the Surface

THE setting and hardening of concrete is a gradual process and the rate of this hardening is dependent on several factors. The time which must elapse before the forms may be removed from the walls will differ, in different cases. Concrete not subjected to any load but its own weight and constructed in such a form that there is no tendency to bend, should be sufficiently set to permit the removal of forms when such concrete cannot be indented by pressure with the thumb. If the concrete is to bear any load, the forms must be left much longer, according to circumstances peculiar to each case.

If exposed to the direct action of sun and wind, freshly poured concrete tends to dry out too rapidly and thus become weakened. Therefore in hot dry weather newly constructed concrete walls should be shaded from the sun and wind for about ten days either by allowing the forms to remain in place, or by covering the concrete with wet bags, hessian or other suitable material. If these coverings are kept wet, the conditions for curing the concrete will be ideal.

Wall surfaces necessarily reproduce all the defects of the forms, so that after treatment is necessary to remove form marks, as well as to relieve the dead colour due to excess of cement at the surface. If a rubbed surface is desired the coarse aggregate should be well spaded back from the face of the work and the forms should be removed before the concrete is set hard, preferably in a day or two after the concrete has been placed. A general level can be given to the surface by using a 1:2 mixture of cement and sand. The application of the surface coating should be carried on continuously in one general direction, without allowing the coating to dry at the edge.

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How to make Concrete Fence Posts

BECAUSE we have now in New Zealand to obtain our timber supplies from increasingly greater distances, the cost of fencing posts is becoming higher and higher, and in some districts the differences in cost between high-quality timber posts, and concrete posts, is negligible. When it is remembered that the best of timber posts will eventually decay, whereas concrete posts are practically everlasting, it will be seen that it is well worth while considering concrete posts, particularly where you can make them yourself.

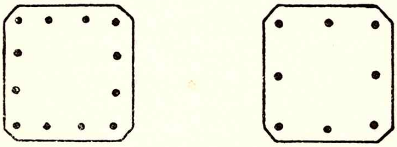
On most farms there are slack times in between seasons, and the making of concrete posts is a job which can then be carried out. In this way their cost of manufacture is relatively low because the staff are employed at a time when they would otherwise be idle. The careful farmer will, therefore, be wise to get the habit of making concrete posts for his own use, in which case he will always have at hand a job for the men. No expert knowledge or special skill are needed to make them, it being necessary only to follow out the instructions carefully.

Four Standard Types In General Use.

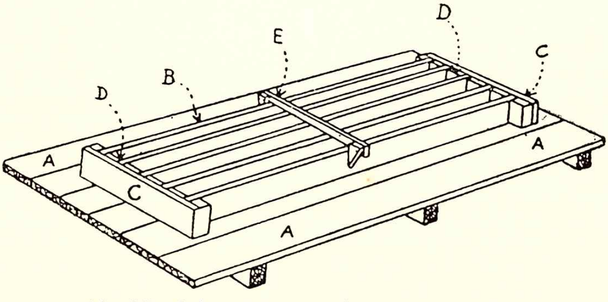
THE posts can be cast in any shape or size desired. They generally take one of the following three standard types:

1. Posts squared, or nearly square in section, without being tapered.
2. Posts tapered on two sides.
3. Posts tapered on four sides.

These concrete posts possess many advantages over wooden ones. They are stronger, more lasting, and cannot be burnt, so that where



Transverse section of two corner posts, showing position of reinforcement rods.



Mould of four untapered concrete posts.

desirable, weeds can be cleaned out under fences constructed with them by means of flame-throwers.

Good quality materials are needed. The maximum size of the gravel used should be ½inch, and the sand should be free from dirt and dust. All the materials should be measured accurately. A bottomless box, which holds one cubic foot of material, provides a convenient measure, and the water used should be measured accurately, and not just guessed. Mixing must be very thorough, and should continue until all the coarse material is completely coated with a thoroughly mixed mortar of sand and cement. For hand-mixing it is essential to have a water-tight mixing platform. This should have strips nailed round three sides, to keep the materials on the platform.

Good Procedure To Follow In Making Posts

A GOOD procedure in mixing the concrete by hand for concrete fence posts is as follows: The measured sand is spread out on the platform and the proportionate amount of cement is distributed evenly over it. The cement and sand are then turned over with square-pointed shovels until the mixture is uniform in colour throughout. The coarse aggregate is then spread evenly over the cement-sand mixture, and the mass turned until the coarse material is uniformly distributed. A hollow is then formed in the centre of the pile and water added slowly as the materials are being turned over. The turning continues until the concrete is thoroughly mixed and the desired consistency obtained.

It should be remembered that the ratio of water to cement governs the strength of the concrete you make. It is therefore important that only sufficient water is used. Remember this when you make use of the tables of materials given for the making of concrete fence posts.

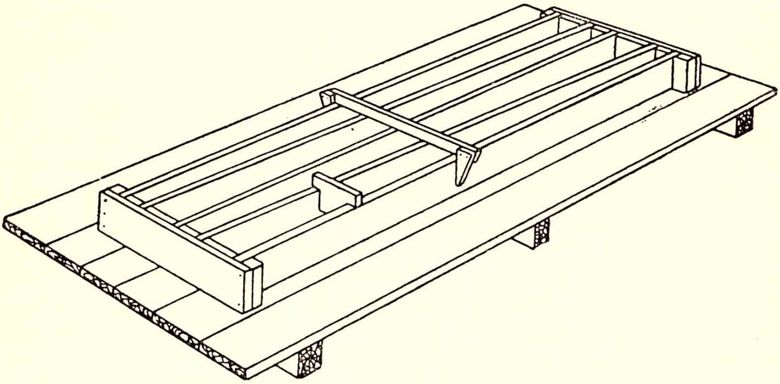
The size and correct placing of the reinforcement is important. Three or four steel bars, nor larger than ⅜inch nor smaller than ¼inch in diameter, should be placed at a distance of ¾inch from the outside surface of the concrete post. This will assure that the rods will be sufficiently covered from the air to prevent rusting. The ends of the steel rods should be bent over at right-angles and turned inwards. If the rods are laced at intervals by stout wire, their strength as a reinforcing medium will be considerably increased.

The reinforcement should be placed in position in the mould before the concrete is deposited. The rods should first be wired together at the correct distance apart, thus forming a kind of framework, and the whole placed in a mould and suspended from bars or cleats laid across its upper edges. The way in which this is done is illustrated. The suspending wires can be removed when most of the concrete has been placed in position.

How To Arrange The Moulds For Posts.

THE moulds for making concrete posts are generally arranged in sets, and consist of a series of bottomless boxes or troughs attached to each other. These sets are placed upon a base-board when concreting.

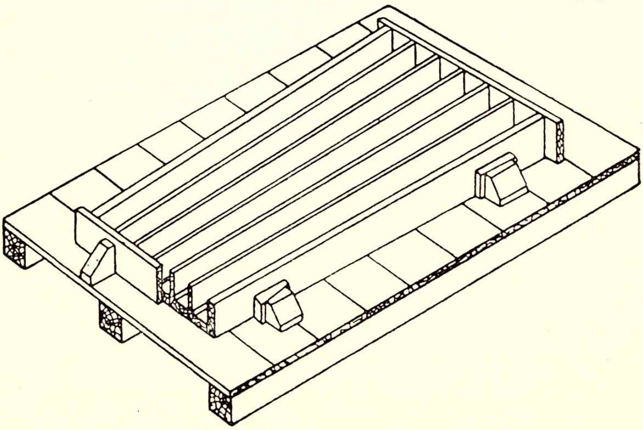
In the diagram, which shows a set for making four posts, A is the baseboard, B indicates the wooden boards of inch to inch-and-a-half timber, required to form the side of the posts, C. indicates the end pieces, to which are attached the "lugs" indicated by the letter B, leaving slots into which the boards B fit. E is the brace to prevent the side from bulging, of which one or more may be used. The length, width and depth of the spaces between the boards will correspond to the dimensions of the post to be moulded. The ends and sides can be held together by hooks and eyes, or screws, or by wedges placed between blocks on the baseboard, but whatever method is adopted it should be such that the parts of the mould may be removed easily when the concrete posts have set and hardened.



Mould for making fence posts tapered on two sides.

Making Tapered Concrete Posts.

THE first diagram shows a set of moulds for making untapered posts, but the others illustrate moulds that are tapered in different ways. The second diagram shows a set of moulds for constructing posts which



Mould for six posts tapered on four sides.

taper on two sides. It will be noticed that the moulds are arranged so that the broad end or butt of one post, lies next to the narrow end, or top, of its neighbour, and so on alternately, thus securing economy in space. Still another illustration is shown of a set of moulds tapering on all four sides. In this design it is not possible to arrange the tapered moulds alternately as in the case of moulds tapering on two sides. All the butts, therefore, are on one end, and all the tops at the other.

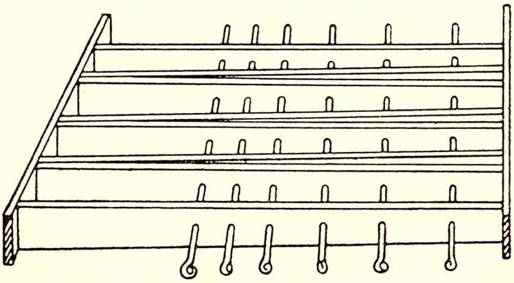
Concrete corner posts and strainer posts usually require to be made stronger than the average line post. The dimensions of these corner posts may be 8in. by 8in., 10in. by 10in., or 10in. by 12in. The reinforcement used should be $\frac{1}{2}$in. steel rods, and should be placed on all four sides as well as in the corners of the posts.

Where a number of posts are to be made, the upper edges should be protected by being cased with strips of sheet iron, so that injury to the wood during tamping and trowelling will be avoided. Also as it is usually desired that fence posts should not present sharp edges, triangular strips of not more than $\frac{3}{4}$in. in thickness are placed in each angle of the mould. The top edges of each post, when formed in the mould, may be bevelled or rounded after the concrete is placed, by an edging tool. This gives a neat finish to the posts, and avoids all chipping, to which sharp edges are liable. Round edges on posts prevent injury to animals which may come in contact with them.

Grease The Inside Of Concrete Post Forms.

BEFORE using, the inside of the forms should be greased with either soft soap, linseed oil, or lard mixed with kerosene or crude oil, to prevent particles of concrete from sticking to the forms when removed, and giving the surface of the concrete an unnecessarily rough face. Used motor-car oil has been found quite effective for this job, provided it is used liberally.

Concrete posts at the end or corners of fence lines are subjected to great strains, and they must therefore be made more strong than the line posts. They must also contain a correspondingly increased amount of reinforcement. On account of the weight and size of such posts it is usually found most convenient to build them on the site. Probably the most convenient method of constructing them is to excavate carefully to a depth of not less than three feet so that the earth may serve for



Mould with iron rods in position for casting holes.

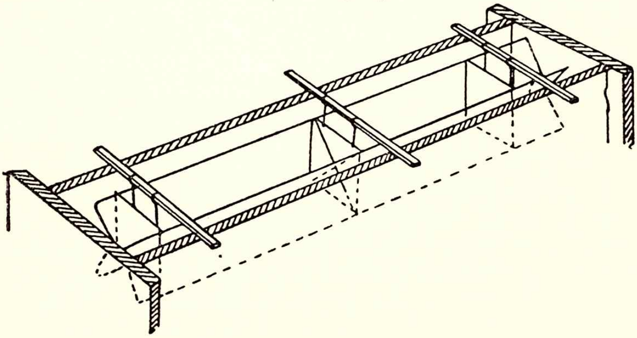
forms. The hole is then filled with concrete to ground level, taking care to insert the proper reinforcing rods so they will extend from the top of the post to a point at least two feet below ground level. Forms for the post can then be placed directly over the fill already made, and the filling completed.

Special care must be taken in making end posts, corner posts and gate posts in place, when the work is done during cool weather, that the concrete is protected from any possibility of freezing, and fencing should not be fastened to them until they have had at least 30 days to harden under favourable conditions. In warm weather the forms should be left in place for several days to prevent the concrete from drying out. Then when the forms are removed the posts should be covered with wet hessian or sacks and both concrete and protective covering be sprinkled several times a day so that there will be a proper amount of moisture always present to assist the concrete to harden under favourable conditions. "Sisalkraft" can be used to advantage in place of the above and has the advantage that once it is placed in position it can simply be left there.

Provision must be made when building corner or gate posts to properly imbed the bolts and fittings necessary to attach the wires or to receive the gate hinges. This can be arranged by setting a pipe sleeve in the forms when placing the concrete, and then passing through this pipe the bolt for attachment of wires or hanger that is to receive the eye of the gate hinge, the hanger being threaded on the end passed through the pipe so a nut can be applied. Another way is to place through the forms greased rods which are pulled out several hours after the concrete is deposited leaving holes for the bolts. The rods should be a little larger than the bolt that will be inserted, so that the latter will pass through readily.

Making Concrete Straining Posts.

STRAINING posts are moulded the same way as ordinary fencing posts but in a larger mould. They should be placed at suitable intervals in the fence and it is essential that some provision be made for "struts" or braces for relieving some of the strain on the post. One method of making a "niche" for taking up the strut or brace, is to place



The reinforcement suspended in the mould.

a block of the proper size and shape in the mould when the post is being moulded. Such an indent should not as a rule be more than one inch deep.

The braces or struts, which may be either 3 by 3in. or 3 by 2in., are made of reinforced concrete like the posts. The upper end of each strut, however, must be shaped to fit a mortise or indent in the straining post. When fixed in the ground the lower end of the strut should abut against the earth plate, which is usually made about 15 inches square and 2 inches thick, reinforced with expanded metal or a meshwork of rods placed near the underside.

Very pleasing effects can be obtained in gate-post construction by selecting clean rubble-stones and laying these around the inside of the form against the form face, and filling in behind them with a rich concrete. When smooth surfaces are desired, the concrete should be rubbed with a common brick after the forms have been removed.

Removing the Moulds And Erecting The Fence.

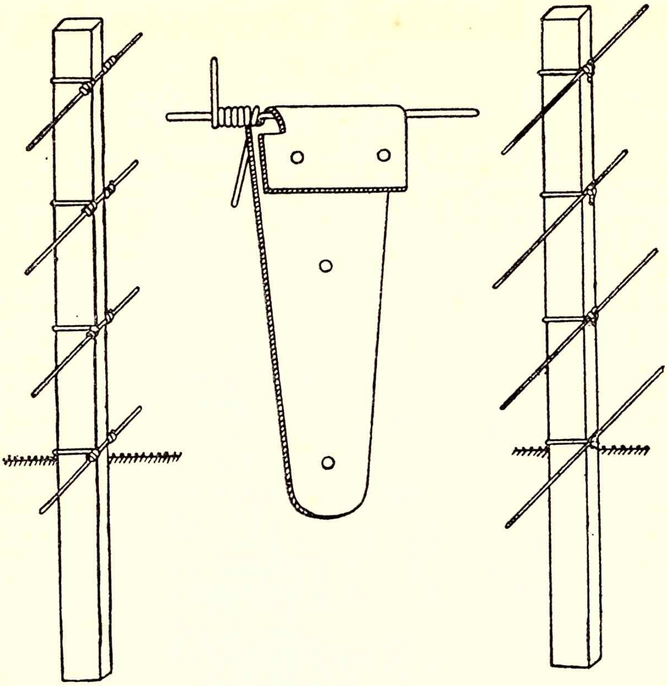
AFTER the concrete has been set in the moulds for upwards of 24 hours, the end and side pieces may be removed, but it is advisable to leave the post in the mould for two or three days, when the mould may be removed. When the concrete posts have been removed from the base-board some means should be devised for keeping them wet for as long a time as possible—months if it can be managed. A good plan is to keep the post immersed in water, a shallow pond with a flat bottom being ideal for this purpose. A smooth bed of wet sand sheltered from the sun, and sprayed with water daily, will also serve the purpose.

In setting up the fence it must be remembered that if the posts are not square in section, the narrow side must face the most probable direction from which the strain will come. Thus, for example, in a fence dividing a field from a road, the narrow sides would face the field, and road respectively, and the broad sides would face the next post on either side.

Posts 7 feet long are usually set in the ground 2ft. 6in. to 2ft. 8in. deep. The earth round the post should be thoroughly consolidated by ramming, and if the feet are concreted in with a weak concrete of 1 in 6, the result in additional strength will repay the trouble.

Attaching The Wires To Concrete Posts.

THE general practice for attaching fencing wire to concrete posts is the simple method of drawing binding wire attachments around three sides of the post, and twisting their ends around the fence wire. as illustrated. One advantage of this method is that, if for any reason the posts cannot be set at the same depth, the wire attachments may still be placed in alignment. Another method is that of casting long staples in the post and attaching the wire to these. When this method is adopted the staple should be of galvanised iron in order to prevent



Method of attaching fence wires.

rust. The inner ends of the staple should be bent to prevent their extraction from the post.

The method chiefly adopted, however, is that of threading the wire through holes previously cast in the concrete posts. Where such holes have been cast, they are formed by inserting iron rods horizontally through the holes in the divisions of the mould. These rods are fixed before the concrete is set in the moulds, and the rods are slightly greased so as not to adhere to the concrete. When the concrete is sufficiently set to retain its shape—which usually takes from four to six hours—the rods are withdrawn.

When it is desired to attach barbed wire to concrete posts, the common practice is to cast holes in the post in the direction from front to back, instead of from side to side as for plain wire. The barbed wire is then attached by wire loops shaped like a hairpin and passed through the holes in the post. However it will probably be found in practice that the better method is not to cast holes in the concrete posts, but to depend upon wire attachments going round three sides of the post. If desired a groove can be cast at fixed intervals round the three sides of the post so that the wire attachments will not slip up or down the post.

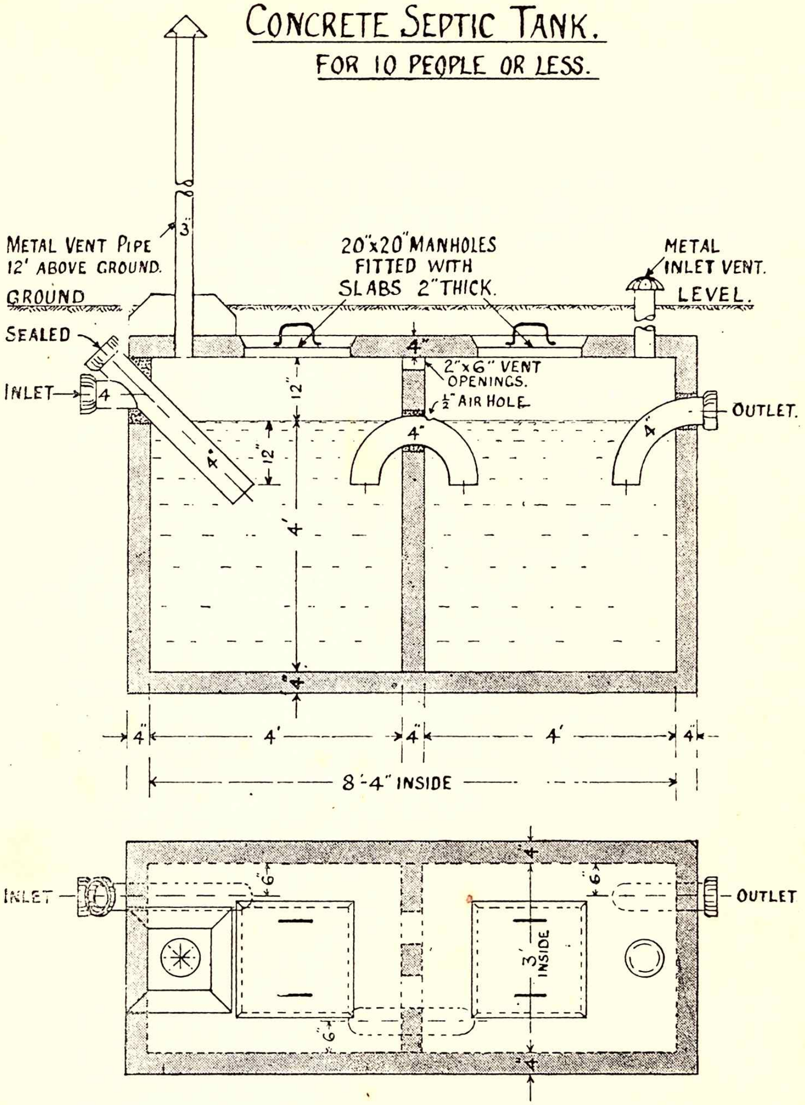
How To Build A Concrete Septic Tank

A SEPTIC tank is a watertight receptacle in which the solid particles in sewage are broken up by bacterial action. Part of the solids is converted into gases and liquids, while a small portion rises to the surface of the water level in the tank. When the septic tank is working, a scum forms on the surface, and the tank is designed with baffle-boards and special inlets and outlets so that incoming sewage will cause the least possible disturbance of the sewage already in the tank. The contents of the tank must remain quiet if the best results are to be secured. It is also important that a septic tank should be of sufficient size to ensure reasonably complete dissolution of the solid matter by bacterial action, so that in designing a septic tank it is advisable to make it large enough to hold the minimum shown in the table further on in this article, no tank holding less than 600 gallons in all. The two-chambered septic tank illustrated here has been proved thoroughly satisfactory in hundreds of New Zealand homes, and we recommend it over the one-chambered type.

Three Separate Parts To The Septic Tank

FOR the successful operation of a septic tank, there are three separate parts to be considered. First, there is the water closet with the usual fittings, and an adequate water supply. Where reliance has to be placed upon rainwater tanks, the position is frequently unsatisfactory in a dry summer. The second part of the system consists of the concrete treatment tank, as illustrated here, otherwise called the septic tank. The third part is the lead away from the tank and the treatment of the effluent in some way to assist in its purification. This can be accomplished in several ways. In gravelly and light pumice land, a short length of field tiles will allow the effluent to seep gradually away into the soil, but in heavier land, and on flat country, a much longer length of tiling will be needed. The pipes should be ten or twelve inches under the surface, and on heavy land if you allow a distance of 30 feet for every person served by the system you will find the drainage satisfactory. There should be a pitch of about 1 inch in every 10 feet to ensure drainage. You will be wise to locate your pipeline so that if an extension becomes necessary the pipes are easily found. If sewerage appears on the surface above the pipe-line it is an indication that the distribution system is too small and that it should be enlarged.

The sewer line connecting the plumbing system in the water closet with the septic tank should consist of four-inch diameter drain pipes with cemented joints to prevent leakage. These should be laid with a uniform slope of between ½in. and 1in. per yard. It is also a good practice to use a few lengths of pipes with cement joints at the tank outlet so that there will be no leakage near the tank site.


CONCRETE SEPTIC TANK.
FOR 10 PEOPLE OR LESS.
METAL VENT PIPE 12' ABOVE GROUND.
3"
GROUND
20"x20" MANHOLES FITTED WITH SLABS 2" THICK.
METAL INLET VENT.
LEVEL.
SEALED
INLET
4
4"
12"
4'
4"
2"x6" VENT OPENINGS.
1/2" AIR HOLE
4"
OUTLET.
4"
4"
4'
4"
4'
4"
8'-4" INSIDE
INLET
6"
6"
6"
4"
3' INSIDE
4"
OUTLET

REINFORCE WITH 1/4" DIAM. RODS ARRANGED IN THE FORM OF MESHWORK, 6" APART EACH WAY IN ROOF, AND 12" APART EACH WAY IN WALLS & FLOOR. RODS TO BE LOCATED 1" FROM UNDER SIDE OF ROOF, AND 1" FROM INNER FACES OF WALLS AND FLOOR.

J. R MARKS, A.M.Inst.C.E. 12-5-34.	(SEE SPECIFICATIONS)	WILSONS (N.Z.) PORTLAND CEMENT LTD. AUCKLAND, N.Z. DRAWING No. 20A.

This diagram is published by courtesy of Wilson (N.Z.) Portland Cement Ltd. for whom it was prepared. The information given on septic tanks in this book comes from the same source and deals with the latest and most approved type of septic tank.

Construction Of The Septic Tank Proper

THE septic tank itself must be constructed of good-quality concrete, and should be partitioned into two separate compartments. Sewage is delivered into the first compartment by a sloping pipe so as to be delivered a foot below the water level of the tank. Provided the tank is neither too large nor too small for the number of persons served, the action of the bacteria digests the solids, leaving only a very small deposit of sludge at the bottom. The gases rise and carry small amounts of semi-solids to the surface, where they form a mat which should not be broken. A properly proportioned septic tank should only require cleaning out at intervals of six years or more.

The water passes by means of an inverted bend into the secondary compartment of the tank which operates in a similar manner upon any solids which happen to pass the first compartment. The water passing from the second compartment, though practically free of solids, is by no means free from harmful bacteria. That is why the effluent requires careful treatment as described above.

No disinfectants should be used where there is a septic tank system, as these destroy the natural action of the bacteria and make the system non-operative for a time. Water from the kitchen, bathroom and wash-house should not be connected with the septic tank system, as such excessive quantities of water would cause too rapid a flow through the tank, and too much disturbance for thorough bacterial action.

If the soil in the sides for the excavation of the tank is firm, and cut smooth, these earth walls of the pit may be used as the outside form for the concrete construction. In such cases the excavation should be made to the exact dimensions of the outside measurements of the tank, care being taken to make the sides of the pit smooth and vertical and the corners square.

Tanks Of Varying Capacities Are Given

THE drawing shows the smaller size of septic tank, suitable for serving ten persons or less.

The concrete mixture for this tank should consist of: 1 bag of cement (125lbs.) to 4¾ cubic feet of mixed sand and gravel (not coarser than about ½ inch). Provided that the aggregate is moist enough to be non-absorbent, the mixing water should not exceed 6 gallons to each bag of cement. The 10-person tank illustrated requires about 14 bags of cement, 2½ cubic yards of mixed aggregate, and 26 18ft. lengths of ¼-inch diameter steel (equal to 78lbs. of steel).

The following table shows recommended dimensions of rectangular septic tanks for different numbers of persons served. In each case the length is the same, namely, 8ft. 4in., and the depth the same, namely, 5ft. The other dimensions are as under:—

No. of Persons Served.	Width.	Capacity in Gallons.
10 or less	3ft. 0in.	600
12	3ft. 6in.	700
18	4ft. 0in.	800
24	5ft. 0in.	1000

The sizes recommended for 12, 18 and 24 persons require 1/12th, 1/6th, and 1/3rd more material respectively than the 10-person tank.

Useful Rules When Making Concrete

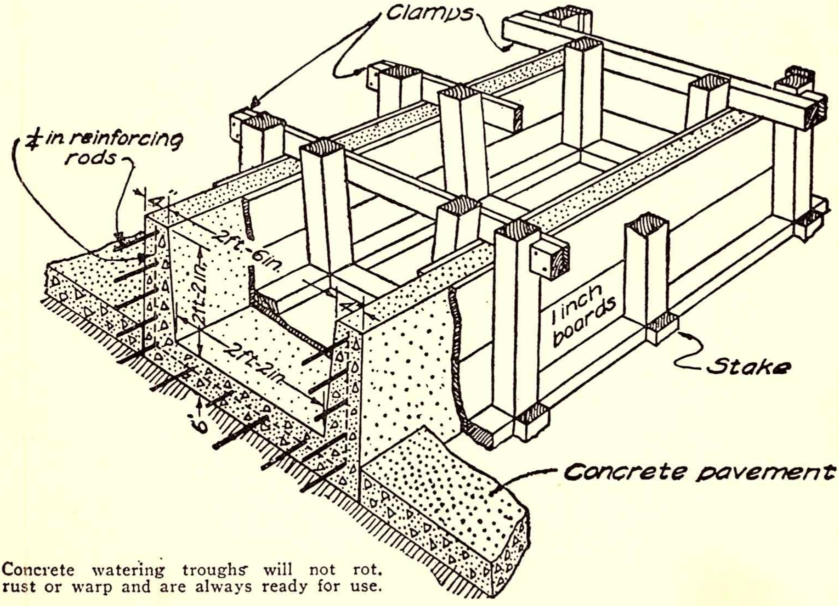
1. Calculate exactly how much finished concrete will be required.
2. Ascertain how much cement, sand, coarse aggregate and timber for forms will be required.
3. Choose good materials and, if necessary, wash the sand and coarse aggregate, and use only clean, clear water for mixing purposes.
4. Build a mixing board and procure or make suitable measuring boxes so that you will mix with accuracy.
5. Construct the forms in position. Forms should be clean, and must be greased.
6. Do not guess, but carefully measure off quantities of materials for concrete. Batches should not be too large.
7. Mix your materials thoroughly and a little more.
8. Thoroughly saturate the surfaces of foundations with water before placing the concrete mix.
9. Place concrete mix in position as soon as possible after wetting, and tamp well, spading the edges adjoining the forms.
10. Do not over-trowel or "float" the concrete surfaces or use mortar for surfacing, which is too rich in cement.
11. Protect the finished concrete from sun and air by keeping it continuously wet for the specified period. Do not remove forms until the concrete is hard.

Making Concrete Tanks and Troughs

CONCRETE is the ideal medium for the construction of tanks and troughs for the watering and feeding of stock. They will not rust, warp or wear out, are always ready for use, and can be easily kept clean. They must be made with 1:2:3 concrete mixture where they are intended for the holding of liquids, and should be reinforced with either steel rods or wire mesh, $\frac{1}{4}$in. to $\frac{3}{8}$in. steel rods being the ones generally used. The number, size and spacing of these is governed by the size of the tank; the larger the tank, the greater the quantity of reinforcement needed.

Small feeding troughs like the one on page 148, can best be cast upside down on some level floor or platform. The forms cost little to make and can be used as often as required. The walls of the larger watering tank shown, are tapered to give added strength. On removal of the forms it is a good plan to give the inside face a wash of cement and water mixed to the thickness of cream and applied with a brush. This closes all the pores and gives a thoroughly watertight finish.

When making troughs the forms should be oiled and assembled upside down on a firm platform, being careful to centre the core or inner form. The quantity of materials needed for the making of one trough with a mixture of one part of cement, two parts of sand and three parts of clean gravel, should be calculated. Dry mix the materials and then add water gradually, mixing constantly until the mass is of a uniform plastic consistency. Place about 1in. of concrete in the forms, tamping in well, and then place a reinforcing rod



Concrete watering troughs will not rot, rust or warp and are always ready for use.

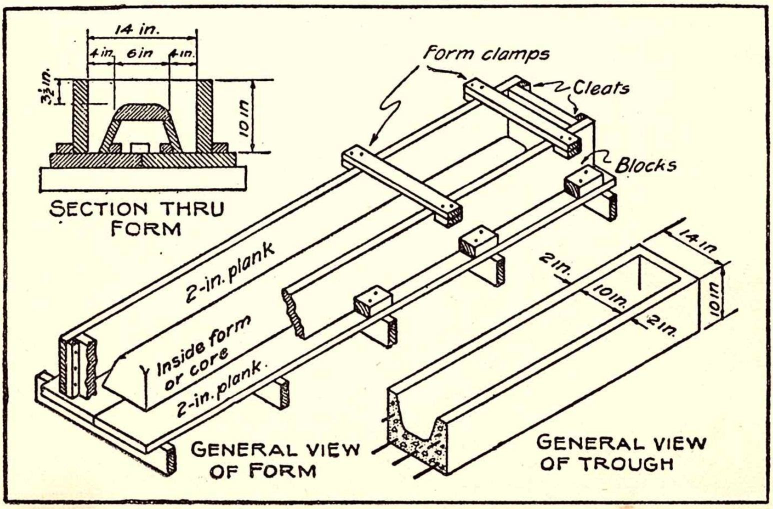
along each side, equidistant from the inner and outer form. Continue filling with concrete until well within 1in. of the top of outer form, tamping well. Place a reinforcing rod about 2in. from each side, then complete filling in concrete. Strike off with straight edge, and smooth with trowel. Let the concrete harden for 48 hours before removing outer form; invert the trough and remove inner form. Cure for at least 10 days before using.

Concrete For Cow Yards, Etc.

CONCRETE floors for milking-sheds, cowyards, etc., are constructed in the same way as paths. If they are small, they may be put down in one piece, but for larger areas, shrinkage definers at 6ft. intervals (both ways) should be provided. In cowyards or stables, the concrete should be given a slope of ¼in. to the foot to facilitate drainage. The most desirable way in which to lay large areas of concrete as floors, or in cowyards, is to do so in strips 6ft. wide defined laterally by side forms, and transversely by shrinkage definers. The scheme is to fill in alternate strips between the side forms and then to fill in the remaining areas when the first portion has set sufficiently to allow tramping. The side forms are, of course, removed before the work is started.

For dairy-shed and other light shed floors, the concrete should be from 3 to 4in. thick, ordinary good concrete made from gravel up to 1in., but for cowyards and heavy shed floors it should be from 4in. to 6in. thick, made from gravel up to 1½in.

Another point to watch in laying down this type of concrete is always to finish off the section on which work is being done—that is, fill up to the nearest shrinkage definer if it is impossible to finish the whole job at one time. New concrete does not bond well with older concrete mixes. If there is any prepared concrete left over, use it for foundations or for filling in a depression rather than append it to the finished section and then continue laying from it next day.



Installing Electric Plants

IN New Zealand, private electric plants are steadily and rapidly increasing in number. Widespread reticulation makes everyone "electricity conscious," and those away from power lines now regard electricity as a necessity rather than a luxury. No Government permit is required for plants to 18-volt, and though regulations are issued for installing, the former routine of an official inspection at your cost has been eliminated. You must follow the regulations, however, and you should advise your insurance company.

Some time back, a flood of small electric plants appeared, some good, some bad. Frequently, even the good were badly installed in utter ignorance of basic electrical principles, for small plants must be installed with far more care and knowledge than 230 volts. Many users were utterly dissatisfied, and condemned all small installations unmercifully. It has been amply proved, however, that a small plant properly selected for its job, and properly installed, is amazingly successful, and with this further knowledge, confidence is restored. Many 18-volt users, in fact, claim equal results to mains lighting. In country districts, where supplied electricity is fairly costly, and smallish lamps are used, this is probably true. It shows how really satisfactory such a plant can be. Frequently, too, running costs are lower.

18 Volt Plants Are Best.

CONTRARY to popular opinion, any old equipment, wire, generator, lamps, etc., will not necessarily make a good plant. Competent advice is obtainable on their suitability, but complete matching should not be sacrificed merely to use, say, a generator on hand. It will cost dear in the long run.

In choosing your voltage, it is impossible to emphasise too much the advantages of 18 volts—the highest permitted without having an electrician to instal. True 6 and 12-volts may be satisfactory for occasional use in shacks, beach cottages, caravans, or perhaps with a Wincharger where fuel costs nothing, but for household use 365 days annually, 18 volts ultimately gives by far the best all-round service.

This is due to several features which, though just as inevitable as two and two make four, are not so easy to understand. On any wiring system, losses are nine times greater on six, and two and a quarter times greater on 12, than on 18 volts. Dimming of lights already on, when another is turned on—flicking of all lights when another is turned on or off, are in the same proportion. Lamp fittings are heavily overworked in lower voltages, and contact springs give trouble.

Job Is Easily Done.

DO not be concerned about actually putting the plant in. The agents (see ad. in this issue) not only issue full instructions which a schoolboy can readily carry out, but in addition will advise you accurately regarding every item of the equipment—whether you can use material, engines, etc., now on hand—how to work your radio without any other batteries. Working out these details is really the most difficult part, and this is all done for you, while you still derive the pleasure and satisfaction of having put in all the wiring, etc., yourself.

Conduit is not used, so special tools are unnecessary. TRS (or CTS) heavy rubber covered cable is employed. When finished, you have a thoroughly satisfactory job, better than the usual 230-volt. Further, if later you change to 230 volts, practically no changes will be required, since all material is 230-volt grade. Wire must be heavy grade, however, even in 18-volt, and it is attached to wall, ceiling, etc., with easily attached clips, every 18in. or so.

Accumulators are always best located somewhat centrally in the house. Engine and generator may then be a long way off—provided suitable connecting wires are used. When using a special engine, it is advisable to run it as nearly full power as possible, because most engines save very little benzine on small loads. This means in turn that generator output must match engine, and accumulator charge rate must match generator. Mis-matching must mean, amongst other things, needlessly large benzine expense. Of course, if you charge from a milking engine already running several hours daily, generator and batteries may be smaller, while cost of electricity will almost disappear.

Health In The Home

The Medicine Chest

HERE is a list of medicines which should always be on hand. Label all bottles boldly. See that poisons and lotions and ointments are separated from the internal remedies and locked away. In any case, it is always wise to keep the medicine chest well out of reach of the younger children.

Almond Oil: Earache.

Aspirins: For headaches and toothache, where advisable.

Bicarbonate of Soda: For acidity, burns and scalds, flatulence, indigestion, palpitation of the heart, etc.

Boracic Powder and Crystals: For fomentations, antiseptic, dusting wounds, etc.

Boracic Ointment: For bruises, etc.

Bran: For poultices.

Camphorated Oil: As an embrocation.

Camfosa: Disinfectant, germicidal and healer.

Camfosa Ointment: For burns.

Castor Oil: Aperient.

Chlorate of Potash: Gargle.

Cough Lozenges.

Crushed Linseed: For poultices.

Dry Mustard: For poultices.

Epsom Salts: Aperient.

Eucalyptus Oil: For colds, catarrh.

Friar's Balsam: Colds, cuts, laryngitis.

Glycerine: For sore throat, colds, coughs, chapped hands.

Ipecacuanha Wine: Emetic.

Lanoline: Skin roughness.

Liquid Paraffin: Aperient.

Liquorice Powder: Aperient.

Oil of Cloves: For toothache, etc.

Peppermint Water: For indigestion.

Sal Volatile: For faintness.

Solidified Eau-de-Cologne: For headache, faintness.

Spirits of Camphor: To inhale for colds.

Tannic Acid Solution (with spray): For burns.

Tincture of Quinine: For colds.

Vaseline: For sore places.

Washing-blue or Soda: For bites, stings, etc.

Zinc Ointment: Skin troubles, sores, etc.

The First-Aid Case:

HERE is a list of things that should always be in your first-aid equipment:—

1 clinical thermometer (with magnifying lens).
1 pair scissors (round ends)
1 long-handled brush made of hair (for painting throats).
1 syringe with detachable nozzle (½-pint size).
1 small indiarubber syringe (for ears and nose).
1 eye-bath.
1 graduated medicine-glass.
1 quart measure.
1 roll boracic lint.
1 packet medicated gauze.
Set of rolls of bandages, 1in., 2in., 3in.
A large piece of oilskin for covering wet dressings.
Packet of cottonwool.
Packet of medicated wool.
Adhesive tape, needles, safety-pins, eye-shield and finger and thumb-stalls.

Hygiene In The Home

SOME of the numerous uses of Camfosa, a disinfectant, germicide, and healer of exceptional merit, are as follows:—

Sores, Cuts, Burns, Bites, etc.: In the case of severe cuts, bath first with a solution of 1-50 (one teaspoonful to a teacup of water). Allow to dry on, then apply "Camfosa" ointment. To cure obstinate sores on children, a small quantity of pure Camfosa may be smeared on with a piece of lint.

Teeth: A few drops of Camfosa in the water, when brushing teeth and gums, purifies the mouth and acts as a safeguard against pyhorrhoea.

Dental Plates: A few drops of Camfosa pure on plate, brush well, then rinse in cold water.

Gargle: Two or three drops of Camfosa to a wineglassful of hot water will relieve and cure sore, inflamed and septic throats.

Bath: A little Camfosa added to the water softens same, and the cleansing and invigorating effect will be much appreciated. Invaluable for children's baths. Affords protection against measles, chicken pox, and other infectious diseases.

Hair: Sprinkle a little Camfosa solution, one teaspoonful to 4oz. bottle of water on to the scalp, massage well in. This will effectually dispose of scurf, dandruff, etc., and render the hair soft and glossy. Camfosa assists the growth of the hair. To kill vermin, apply solution, two teaspoonsful of Camfosa to one pint of water, on a piece of flannel to the hair, rub well in, allow to remain for a few minutes, then cleanse with hot water. Repeat for several days if necessary.

Douches: Three-quarters teaspoonful to one pint tepid water. Camfosa is the perfect antiseptic for feminine hygiene.

Eczema: If there is inflammation, bathe the affected part in a solution of one part of Camfosa to 10 parts warm water (if too strong, add more water), allow to dry on, then apply Camfosa Ointment, specially prepared. Thoroughly cleanse the surface of skin by using Camfosa Soap.

Ringworm, Itch, Lice, Rash: One part of Camfosa to 10 parts of water. Apply twice daily. (Use pure if necessary.)

Chilblains: Bathe the affected parts in hot water, then rub well with Camfosa pure. This will relieve and cure.

General Household Purposes.

To disinfect drains, sinks, w.c.'s, urinals, garbage tins, etc, use 1½ teaspoonfuls Camfosa to each pint of water.

Use Camfosa in the wash-pail (a couple of tablespoonfuls to a bucket of water).

Camfosa is an excellent cleanser and purifier. Mosquitoes and flies avoid rooms where Camfosa solution, two teaspoonfuls to one pint of water, is sprayed.

Add a tablespoonful of Camfosa to the copper when boiling clothes. Softens water, purifies the clothing and takes out grease and oil stains without injurious effects.

Crockery used in a sick room should be washed in solution two teaspoonfuls to one pint of water, and then rinsed in cold water.

Where earth closets are employed Camfosa should always be used. It disinfects and destroys bad odours.

On the Farm.

CAMFOSA is invaluable for washing out cows. Use 1½ teaspoonfuls to one pint of water solution, very effective.

Udder troubles, colds, etc.: Massage well with solution equal parts Camfosa and methylated spirits of wine. (Recommended as a sure cure in early stages.)

Cattle tick: Apply 1:10 solution on cloth.

Footrot sores, etc.: Wash the affected part and pour Camfosa on pure. Re-

To destroy insect pests or cleanse wounds on animals, poultry, etc., 1½ dessertspoonfuls to one pint of water.

Dogs: For eczema, rash, etc., apply two dessertspoonfuls to one pint water solution.

Poultry: Fowl Roup, apply to affected parts, 1-20 solution. For spraying fowlhouses, dog kennels, cowsheds, stables, use two teaspoonfuls to one pint water. Keeps away flies and renders the buildings healthy and fragrant.

Making Washing Day Easier

THERE'S no excuse for long faces on washing day if the housewife has made ample provision for the laundry being done as expeditiously as possible. Given up-to-date equipment and a good drying ground, laundering should be a pleasure, if in addition there is some place where you can dry clothes in wet weather.

Here is a list of laundry equipment which will minimise labour and speed up the work.

Soiled Linen Cupboard: 6ft. by 4ft. Make one with two partitions to give four compartments, and fix a door to each compartment. Just below the top of each have an opening made the width of the compartment, like a letter-box. Name the compartments in the following way: (a) bed linen; (b) kitchen linen; (c) personal linen; (d) children's clothes.

Washing Equipment: Washing machine; wringer; copper and clothes-stick; wash-tubs; wash-board.

Drying Equipment: Clothes line, pegs, props and basket (outdoors); clothes line with pulleys (indoors) or clothes horse.

Ironing Equipment: Irons; collapsible ironing board or ironing table; iron rest; sleeve board.

If you have a large weekly wash, a reliable electrical washing machine will simplify your labour and save time. There are many good makes on the market. You must consider the space available for the machine and the size of the average washing to be done, whether you want one that is a fixture, or whether you want one that can be moved from place to place. Don't decide on any washing machine without having it fully demonstrated and making inquiries as to whether a repair service is available in the event of your buying it.

A Unique Laundry Outfit.

THERE is a unique laundry unit on the market about which you can obtain all particulars from L. T. Hayman, Ltd., of Auckland. It practically does everything except hang out the clothes to dry, and does away entirely with the need for a spacious wash-house. This will allow you to put all that room the laundry now occupies to better use, which will help you in the remodelling of your home. This laundry unit combines a washing machine, designed to reduce wear and tear on the clothes as it forces the water and suds through the clothes, and not the clothes through the water, two tubs with a wringer attached, and a built-in cupboard and ironing board under them.

This machine has the added advantage of sterilising the clothes by boiling them electrically.

Ironing Board: Should be padded, first with an old blanket, and then with an old sheet or a piece of unbleached sheeting. It's quite easy to make an ironing board at home. If you do, see that you give it an iron rest, but place a sheet of asbestos beneath to prevent scorching. It's always best to have a movable one that can be taken off and washed occasionally. Attach the top cover by four pieces of tape at each end to tapes on the under cover.

Washing Day Hints.

1. Soak handkerchiefs before washing and boiling in half a pailful of cold water containing a handful of kitchen salt.

2. Remove any stains from table or tea cloths or tray cloths before washing. If the stain won't disappear when you pour a little boiling hot soda water through it, soak it in glycerine for a little while, then wash in the usual way. If it is ink, soak in milk or buttermilk before washing as usual. If a fruit or wine, treat like tea, coffee or cocoa.

3. Don't boil any dirty kitchen towels or oily overalls with other clothes. Plunge them into the copper or wash boiler after the other clothes have been removed, and add some extra soap or soap powder or paraffin, in the proportion of 1 tablespoonful to 2 pails of water. Taniwha Soap Powder is a good brand and has the added advantage of economy when bought in the large packets. Bring to the boil and boil for 30 minutes, then wash like other clothes with planty of fresh soapy water. Rinse well, then dry outside to remove paraffin odour.

Modernising The Fireplace

WHEN one wishes to modernise one's sittingroom, the fireplace often seems to be an obstacle. A fireplace in the style of, say, 1921, with furniture and walls in the 1941 manner, doesn't go down. The fireplace is the most prominent feature of the room, and just can't be ignored or camouflaged. The only thing to do is to have it altered. Expensive? Much less so than you might think, if you choose the right material.

An excellent choice is glazed bricks, which any bricklayer can lay, and which are themselves inexpensive. Bricks are, indeed, the best of all materials for a fireplace. Being a product of fire—burned in a furnace far hotter than any home fire can be, they resist heat perfectly, which neither stone nor concrete can always be relied upon to do. Natural brick is better, too, than plastered brick for a fireplace front, because, as the bricks and the plaster expand and contract differently, the plaster is very liable to crack. Glazed bricks never crack and are practically everlasting. Soot or smoke cannot harm them.

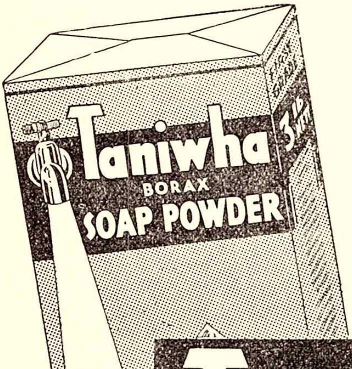
Natural And Permanent Colours.

ANOTHER point in favour of bricks as a fireplace material is that their colours are natural and permanent. They never fade as concrete, which has been artificially coloured with dye, is very liable to do.

By blending different bricks together, a great variety of colour schemes can be produced. Those who want an essentially practical fireplace will probably choose glazed bricks. With a brick fireplace your choice is not limited to a standardised design. You can have one built to suit you.

It is important to have the combustion chamber in which the fire burns, built in the right shape. The back should slope forward and the sides should be splayed, so that the opening is wider than the back, in order that the heat shall be thrown forward into the room. A perpendicular back with sides at right angles causes most of the heat to go up the chimney.

"Shorten Your Washday with TANIWHA Soap Powder"



Use TANIWHA SOAP POWDER on YOUR next wash-day. See how Taniwha's quick, rich lather brings out every trace of dirt with the utmost ease and thoroughness—TANIWHA SOAP POWDER gives a whiter wash with a minimum of rubbing.
ASK YOUR GROCER FOR THE BIG 3LB. PACKET of TANIWHA SOAP POWDER—it's most economical.
Taniwha Soap Powder is the ideal cleanser for use in electric Washing Machines.

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Borax
SOAP POWDER

Made by the makers of TANIWHA BAR SOAP.

Water For The Farm and Farm Home

Without water there would be no life—a trite saying, but one that is absolutely correct. Nowhere is water of greater importance than on the farm. There, in addition to providing for the many comforts in the home that only a good water supply can make possible, it gives freedom from worries over stock during the dry season.

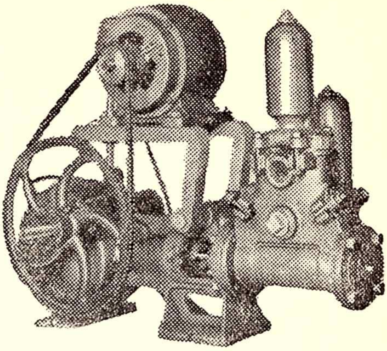
WATER is all-important anywhere, but still more so on the farm. A good water supply makes all the difference to stock, to the hygiene of the dairy-shed, and to the farm home. The automatic pressure pumping plant offers most modern methods of dealing with your water problems, assuring you of a perfect and continuous supply of water for all purposes, delivered under pressure. Being automatically controlled, these plants require no personal attention. So long as there is water in your well or bore, this ingenious system delivers a constant supply to troughs, sheds, house and garden. It is most economical, pumping only when water is required. A pressure switch (pre-set at the pressure desired) automatically starts the pump when the pressure is reduced, and cuts out the motor when the correct pressure is regained. A safety-valve is installed and this device operates by discharging water and reducing pressure in the event of any electrical fault developing and causing the pressure switch not to function. To prevent tanks from becoming waterlogged, an air volume control can be installed, which automatically regulates the quantity of air and water admitted into the pressure tank, and does away with the trouble experienced in some systems of tanks becoming waterlogged, making it necessary for tanks to be drained off before pressure can be regained.

The tanks of these pressure systems are strongly made of steel plate, and where you already have an electric pump installed, the equipment can be obtained to convert your system into a pressure one. There are many minor points in connection with these pressure systems, all of which go to make for successful operation, and we would strongly advise you before actually installing a plant, to get in touch with a firm which has had a great deal of experience. The Wallace automatic pressure plant which is made in Auckland is one of the best known (see advertisement on page 155) and the advice of their experts is freely available to you in assisting you to solve your farm water problems.

Here are some important points to be considered when you are selecting pumping equipment. One of the first and most important, is the amount of water needed. The average quantities of water required for various purposes on the farm has been carefully calculated from known data, and the figures which follow can be considered as the minimum requirements for which you should allow. Each member of the family will require, for all purposes, including bath, water closet, laundry, etc., an average of 25 gallons per day; each horse needs 10 gallons; each steer or dry cow 12 gallons; each cow producing milk 25 to 30 gallons; each pig 2 gallons; each sheep 1½ gallons.

WALLACE "Powerflo" PUMP

The very latest of powerful pumps designed for high efficiency, reliability and low running cost—operates against high heads—model A delivers 500 g.p.h. against a head of 250 feet; model AH delivers 260 g.p.h. against a head of 595 feet.



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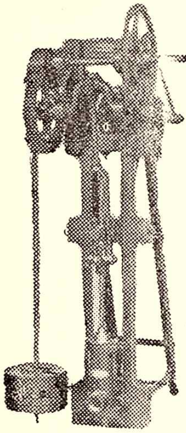
Invest in a Wallace Pump now and be sure you have a plentiful supply of fresh water for every need. Wallace Pumps are famous for efficient operation and long, dependable service at the lowest cost. Send for details at once—and install one of these modern pumps to supply plentiful fresh water to milking shed, fields, home, garden, wash house—anywhere you desire.



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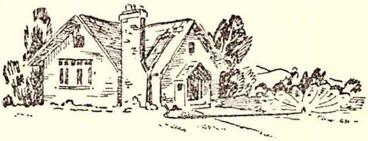
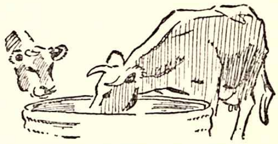
The Wallace Deepwell Gearing is especially built for working deep wells or bores—has capacity of 300 gallons per hour—chain or belt drive.

Both the "Deepwell" and "Powerflo" Pumps can be supplied combined with the Wallace Automatic Pressure Plant, and there is a Wallace Pump for every farm need.

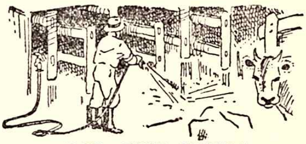


FOR HOME AND GARDEN.

FOR THE WASHHOUSE.



FOR THE STOCK.



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INDEX

Page

- A Handy Saw-horse 88
- A Home Medicine Chest 150
- A Home Work-bench 87
- All Types of Bookshelves 104
- Applying Glue to Wood 85
- Bathroom, How to Modernise 42
- Beautiful Corner Bookshelves 99
- Bedroom Furniture, How to Make 94
- Bookshelf Lamp Bracket 107
- Bookshelves With Plinth 107
- Brace and Bit, How to Use 73
- Building-in a Bookcase 54
- Built-in Dining Room Sideboard 51
- Built-in Furniture for Comfort 48
- Built-in Wardrobes 50
- Building Your Own Garage 63
  - Erecting the Walls 65
  - Making the Doors 66
  - The Larger Garage 67
- Building Concrete Steps 129
- Care of Your Tools 69
- Chisels, to Sharpen 71
- Clothes Airer 120
- Clothes Horse 120
- Constructing a Garden Seat 89
- Constructing a Tallboy 96
- Converting Old Tools 79
- Concrete Fence Posts 132
  - Arranging Post Moulds 137
  - Attaching Wires to Posts 141
- Concrete, How to Mix and Make 121
  - How to Make Forms 123
  - How to Remove Forms 124
  - Placing in Forms 123
- Concrete Paths 125
  - Estimating Quantities 127
  - Placing, Finishing and Curing 127
- Concrete Septic Tank 143
- Concrete Steps 129
  - Form for Steps 130
- Concrete Walls 131
  - Joining Wall Sections 132
- Compact Fitted Wardrobes 53
- Corner Wardrobe 112
- Curtains for the Home 56
- Depth Gauge, How to Use 75
- Details of Garden Seat 89
- Details of Garden Table 93
- Details of Work Bench 87
- Detailed Tallboy Plans 97
- Dining-room Sideboard, to make 51
- Dowels, How to Use 84
- Drawers, How to Make 97
- Easily Made Corner Wardrobe 112
- Easily Made Garden Seat 91
- Electricity for the Home 59
- Estimating Wallboard Required 37
- Fastening Boards to Wall 38
- Fenceposts, Making Concrete 132
- Fittings for the Wardrobe 96

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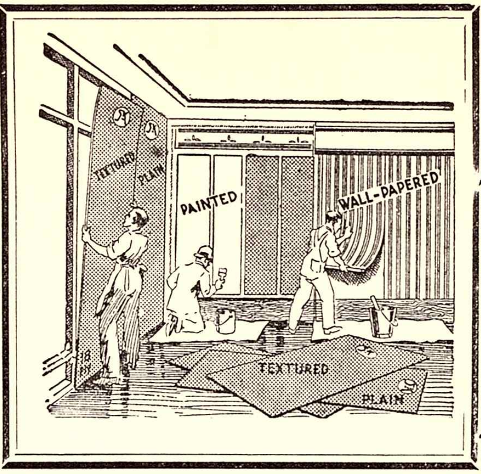

IN PLACE OF SCRIM FOR WALLPAPER.

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100 sq. ft.

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WHAT'S YOUR JOB?

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Whatever your job there is a grade of Sisalkraft to suit your purpose.

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Stop condensation drips and prevent ugly stained ceilings by using Sisalkraft under your corrugated iron or tiled roof.

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INDEX.

Page

- Folding Ironing Board 116
- Foot Mat for Garden Seat 92
- French Polish, How to 31
- Furniture for the Bedroom 94
- Garden Seat, How to Make 89
- Garden Seat Foot Mat 92
- Garden Table 93
- Gibraltar Board, How to Use 34
- Glued Joint, How to Make 85
- Glued Mortise and Tenon Joints 82
- Hanging Bookshelf 105
- Hanging Curtains Properly 56
- Hardboard Wallboard, How to Use 36
- Home Medicine Chest 150
- How to Make Built-in Wardrobes 50
  - Dining-room Sideboard 51
  - Compact Fitted Wardrobes 53
  - Curtains for the Home 56
  - Repairs to Electrical Fittings 59
  - Joints in Wood 80
  - A Nest of Tables 109
  - A Corner Wardrobe 112
  - A Vegetable Storage Rack 113
  - A Kitchen Stool 114
  - A Smoker's Cabinet 114
  - A Ladder 116
  - Household Steps 119
  - A Right-of-way Gate 118
  - A Clothes Horse 120
  - A Clothes Airer 120
  - Concrete 121
  - A Folding Ironing Board 116
  - A Septic Tank 143
  - Dovetail Joints 81
  - Mortise and Tenon Joints 82
  - A Glued Joint 85
  - A Work Bench 87
  - A Saw Horse 88
  - A Garden Seat 89
  - A Garden Table 93
  - A Wardrobe 95
  - A Tallboy 96
  - Tallboy Drawers 97
  - A Light Occasional Table 102
  - A Miniature Garden Glasshouse 103
  - Bookshelves of All Types 104
- How to Mix Your Own Paint 19
- How to Modernise Bathrooms 42
- How to Paper Rooms 44
- Home Soldering 76
- How to Set a Plane 69
  - Sharpen a Chisel 71
  - Solder Successfully 76
  - Stack Jointed Timber 86
  - Use a Brace and Bit 73
  - Use Dowels 84
  - Use Glue 120
- How to Stain Woodwork 30
- Hygiene In the Home 151
- Ideal Built-in Bookshelves 99
- Indoors Painting 11
- Installing Electric Plants 149

INDEX.

Page

- Joints, How to Make 80
- Jointed Timber, How to Stack 86
- Kitchen, How to Modernise 39
- Kitchen Stool, to Make 114
- Ladder, to Make 116
- Light Occasional Table 102
- Lining Seaside "Baches," etc. 42
- Looking After Your Tools 69
- Making Joints in Wood 81
  - Built-in Wardrobes 50
  - A Glued Joint 50
  - A Work Bench 87
  - A Sawhorse 88
  - A Garden Seat 89
  - A Garden Table 93
  - A Wardrobe 95
- Making a Tallboy 96
  - Tallboy Drawers 97
  - A Hanging Bookshelf 105
  - A Nest of Tables 109
  - A Vegetable Storage Rack 113
  - Concrete Paths 125
  - Concrete Fence Posts 132
  - Concrete Septic Tank 143
  - Concrete Tanks and Troughs 147
- Making New Tools From Old 79
- Making Wash Day Easier 152
- Miniature Garden Glasshouse 103
- Mixing Your Own Paint 19
  - White Lead Paint 19
  - Must Be Thorough 20
  - Proper Quantities of Lead and Oil 21
  - Formulas for Different Paints 22
  - Floor Paints 23
- Modernising and Lining Rooms 32
- Modernising a Kitchen 39
- Mortise and Tenon Joints 82
- Nest of Tables, to Make 109
- Painting the House 6
  - Preparing the Surface 6
  - Removing the Paint 7
  - Starting the Job 8
  - Galvanised Iron Roofs 8
  - Farm Buildings 9
  - Exteriors of Buildings 6
  - Indoors 11
  - Ceilings 12
  - With Oil-bound Distemper 14
  - With Oil Paint Indoors 15
  - Bathrooms and Kitchens 16
  - And Staining the Floors 16
  - With Whitewash 24
  - Useful Hints On 25
  - With Good Quality Brushes 25
  - Furniture 26
  - Wicker and Seagrass 27
  - And Priming Wallboards 28
  - With Flat Paints 28
  - Staining and Polishing Woodwork 30
- Paint, How to Mix Your Own 19
- Painted Mortise and Tenon Joints 83
- Painting Garden Seats 89

INDEX.

Page

Papering Rooms 44
  Measuring the Room 45
  Cutting and Pasting 45
  The Ceiling 46
Planes and How to Set Them 69
Planes, How to Buy 71
Plane Irons, to Sharpen 70
Planing Wood for Glue Joints 85
Pulpboard Wallboards 37
Rack for Vegetables, to Make 113
Recipes for all Types of Paint 19
Remedying Electrical Faults 59
Rubbing a Glued Joint 86
Rubbing Down Old Paint 26
Right-of-way Gate, to Make 118
Rooms, How to Paper 44
Rooms, Modernising and Lining 32
Sawhorse, to Make 88
Saws and Their Care 73
Seat for Outdoors 89
Septic Tank, to Make 143
Sharpening Chisels 71
Shelves, to Erect 117
Smoker's Cabinet, to Make 114
Soldering and How to Do It 76
Special Bookshelf Section 104
Storing Paint Brushes 27
Staining and Polishing Woodwork 30
Stacking Jointed Timber 86
Standing Bookshelves, to Make 105
Successfully Glueing Dowels 84
Sturdy, Cheap Garden Seat 91
Summer Camping Table 111
Steps, How to Build in Concrete 129
Table Bookstand, to Make 106
Table for the "Bach" 111
Testing Alignment in Making Joints 85
The Bedroom Wardrobe 96
The Dovetail Joint 81
The Rubbed Glued Joint 86
Tools, Care of 69
Using a Depth Gauge 75
Using Gibraltar Board 34
Useful Garden Table 93
Using Glue Correctly 120
Using Up Old Tools 79
Using the Brace and Bit 73
Use of Dowels 84
Useful Concrete Making Rules 146
What to Do With Old Tools 79
Walls, How to Build Concrete 131
Wardrobe, How to Make 95
Wardrobe Fittings 96
Woodwork, How to Stain 30
Working Ceilings With Wallboard 39

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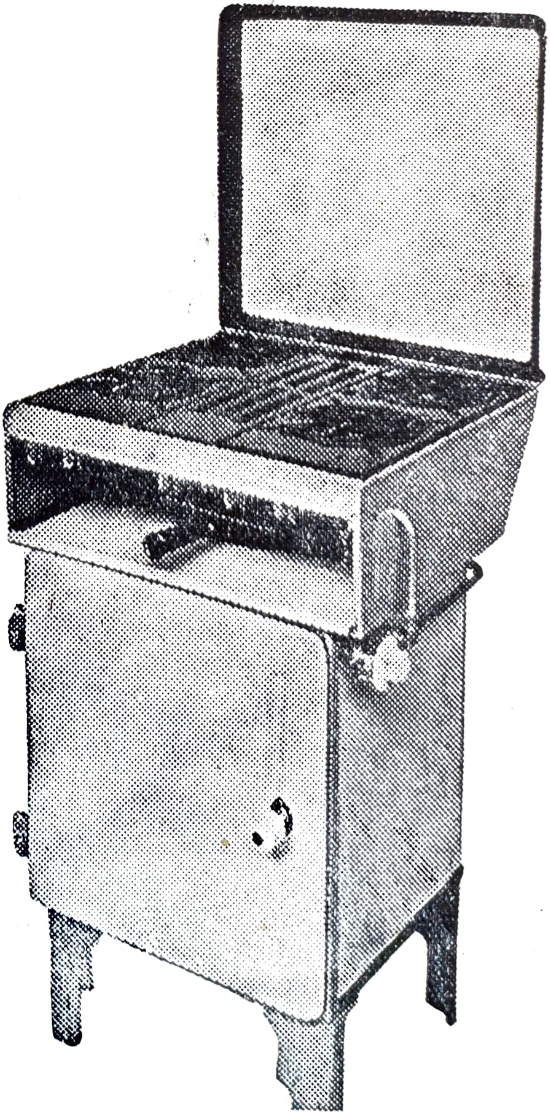
For more "Pot Room"—

the New Model G

CHAMPION

Gas Cooker

with the DIVIDED Hotplate



Model G, newest addition to the Champion high speed automatic de luxe Gas Cookers, combines all the de luxe model features, PLUS the new type divided hotplate. This hotplate makes cleaning even quicker and easier and gives you more "pot room" on top of the cooker. The folding table top encloses the entire hotplate when not in use, giving a most compact appearance. The cooker is finished throughout in gleaming porcelain enamel.

See the Model G and the full range of Champion models at your nearest Gas Showrooms.

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